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NOVEMBER 8, 1954

# American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

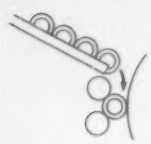
## NEW TOOLS . . . AUTOMATED MAKE '55 CARS

First roundup of key setups that point trends

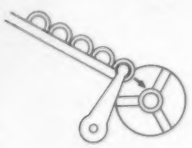
Pontiac . . . Buick . . . Chrysler . . . Packard . . . AC Spark Plug . . . Saginaw Steering

One machine automated . . .

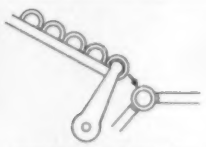
or a whole line . . . see page 2



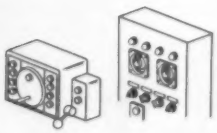
AUTOMATIC LOADING AND LOCATING IN CENTERLESS ROLLS



AUTOMATIC CHUCKING



AUTOMATIC LOADING AND LOCATING, CENTRI-MATIC



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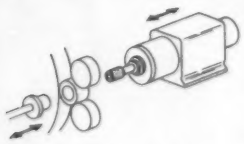

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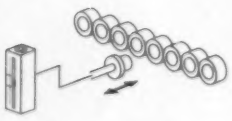
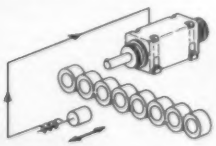
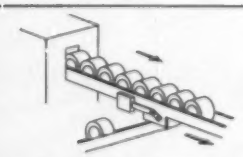


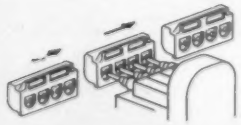
AUTOMATIC GAGING



FEED-BACK

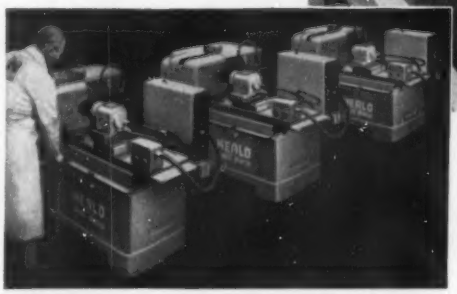


AUTOMATIC HANDLING AND SORTING



AUTOMATIC TRANSFER

Heald transfer-type Bore-Matic arranged for fully automatic drilling, reaming, boring and facing of valve seats and stem holes in automotive cylinder heads. Machine consists of a series of basically standard Heald way-leg units, sequentially machining the work through the various stations to the far end fully automatically.



Heald battery-type Internals permit fully automatic operation of a bank of machines from a single hydraulic power unit. One operator can easily tend several machines.

# How Heald AUTOMATION fits into your production plans

AUTOMATION is the newest trend in modern production efficiency. Yet it has occupied the attention of Heald engineers for many years. In fact a number of important developments contributing to fully automatic operation were developed here at the Heald plant more than a decade ago. And research on automation has progressed unceasingly, as witnessed by scores of fully automated transfer machines, way-type Bore-Matics and battery type Internals now operating successfully in the field.

This background of experience is at your disposal—ready to solve virtually any precision finishing problem, carrying it through in many cases from rough casting to finished part. Your nearest Heald representative will welcome an opportunity to show you how Heald AUTOMATION can step up precision and production, with important savings in time and cost factors.

You'll find that IT PAYS TO COME TO HEALD!

**THE HEALD MACHINE COMPANY** ®

HEALD

WORCESTER 6, MASSACHUSETTS

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# American Machinist

MAGAZINE OF METALWORKING PRODUCTION


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ABC ABP

# chips

**AUTOMATED** . . . Some idea of the mechanization characterizing latest additions to automotive production lines is conveyed by the two pictures on our cover. One shows the new model high-speed Michigan gear hobber equipped with Syntron vibratory hopper to feed pinion blanks. While not shown in this view, the machine also incorporates equipment to inspect and classify by size the finished gears. It is in one new Buick line. In the other picture, from Pontiac, a battery of 10 Acme-Gridley 6-spindle automatics at left dumps turned rocker-arm ball studs onto a belt conveyor at lower left. A Rapistan flight conveyor (behind the setup man) lifts parts into a hopper, from which they are fed to a Syntron vibratory hopper that leads into a Syntron power conveyor feeding four Cincinnati centerless grinders at right. The automatics turn the studs, drill oil holes, and roll threads, while the grinders finish turned surfaces. These setups suggest your further study of the all-new and unusual ones in our 48-page report on automotive setups for 1955.

**DETROIT '55** . . . George De Groat, our Detroit associate editor, has been busier than the legendary bird dog these past several months. He has been assembling data on new equipment installed in automotive plants to turn out '55 models. The job was to pick and choose among thousands of machine tools to find those that master mechanics thought most significant, then to get data. It meant picking and choosing among plants, too. The result, 44 pages of pictures and captions, will give you a quick survey of key developments. These are further pointed up by a 3-page summation of principal trends.

**PONTIAC** . . . Major emphasis has been placed on retooling the Pontiac engine, sheet-metal, assembly, foundry and axle divisions. Special and transfer machines embodying radically new principles have been installed, so our descriptions occupy some 23 pages. Other GM divisions represented include Buick, Saginaw Steering Gear, and AC Spark Plug, for a total of 8 pages more.

**NON-GM** . . . Chrysler and Packard are both represented in this issue also, Chrysler with a 4-page story on the V-8 engine line, Packard with two stories, one on the Ultramatic transmission, the other on the V-8 engine. Packard provides good contrast with Pontiac on engines and Buick on transmissions, showing how tooling varies depending upon production. We skipped Ford for this issue, not because there is nothing new there, but because we covered Ford modernization so extensively a year ago (*AM*—Oct 12 '53).

**COMING** . . . *AM* for Nov 22 will include a Special Report on forming integrally stiffened skins, articles on ceramic tools on Russia, bending brakes, intricate investment castings, economics of leasing, a progressive die for a centrifugally cast gear, and others. It's a busy issue.

**ALSO COMING** . . . Within the next several weeks you will receive your 1955 Production Planbook including two new features. One is our "Nuggets," which summarize and classify all the production ideas we published in the past year. The other is a 128-page Special Report on "How to Work Steel." Watch for your copy.

**35-YEAR CENTURY** . . . Edward P Boehnlein started with Century Electric Co, St Louis, 35 years ago as an apprentice tool and die maker. He worked up to experimental toolmaker in electric motor development, then in 1934 became supervisor of the Die Service Dept. He is now in charge of all die servicing, design and maintenance of automatic press feeders, punch-press servicing, die-maker apprentice training, and is project engineer on all new machine welding. He is a member of the ASTE, and wrote the die-setters' manual which starts in our current Reference Book Sheets as a result of his study of die failures.

# Test your BEVEL and HYPOID gears *both* ways on *one* machine

Here is a machine that enables you to make sure bevel and hypoid gears will operate correctly in their final mountings *before* actual assembly, minimizing costly production delays.

This Gleason No. 104 Angular Hypoid Tester gives you the only means of checking gears in these important respects:

1. Running and composite error tests (left) simulate actual operating conditions. Running test determines smoothness, noise characteristics, and wearing qualities. Composite error test provides a quantitative check of tooth-to-tooth error. The indicator mounted in the drive spindle gives this accurate reading.

2. Graphic check (right) of tooth spacing, profile shape and runout gives you a permanent record (chart) against which you can measure accuracy.

### Gears up to 4¼″ diameter

Designed for testing hand-operated gears, fine pitch gears that must operate with minimum backlash and gears which run at high speed, the 104 Tester will handle gears up to 4¼″ diameter.

In the composite check, the drive spindle may move horizontally up to 0.010″ to either side, and a calibrated spring provides any desired pressure between the two mating gears. As the gears rotate slowly, a pointer indicates the composite errors while an electronic pickup head actuates a recorder. The recorder may be engaged or disengaged at any time.

Three interchangeable drive spindles of different sizes are available for this tester, in order to provide a sensitive test for the various size gears which fall within the machine's range.

This is the machine that gives you the quality control that pays dividends on gear production. Send for our complete bulletin.

**GLEASON WORKS**

*Builders of bevel gear machinery for over 85 years*

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# Introducing the New CINCINNATI TOOLMASTER

Style 1C Toolmaster Milling Machine. Equipped with 2 hp heavy duty spindle head; built-in motor; 8 spindle speeds; No. 40 standard spindle nose.

Style 1B Toolmaster Milling Machine. Equipped with 1 hp spindle head; collet chuck type spindle nose, capacity ⅛" to 1" shank cutters; power feed to quill; worm positioning of swivel head.

## MILLING MACHINE

Style 1B Toolmaster Milling Machine. Cincinnati rectangular overarm, square gibbed saddle-knee bearing, extra wide knee bearing on column face . . . these and other features constitute exceptionally sturdy construction for maximum hp cuts.

Meet the newest member of Cincinnati Milling's extensive line of machine tools . . . the Toolmaster. There are three styles of these sturdy toolroom milling machines:

1A — Manual feed to quill
1B — Power feed to quill
1C — Heavy duty spindle head

Toolmaster Milling Machines constitute a new opportunity to reduce costs in shops of all sizes; in toolrooms, metal pattern shops, contract machine shops, tool and die shops. You can depend upon any machine tool bearing the name plate of The Cincinnati Milling Machine Co. Would you like to know more about this new Toolmaster? Write for new four-color catalog, No. M-1870.

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MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES

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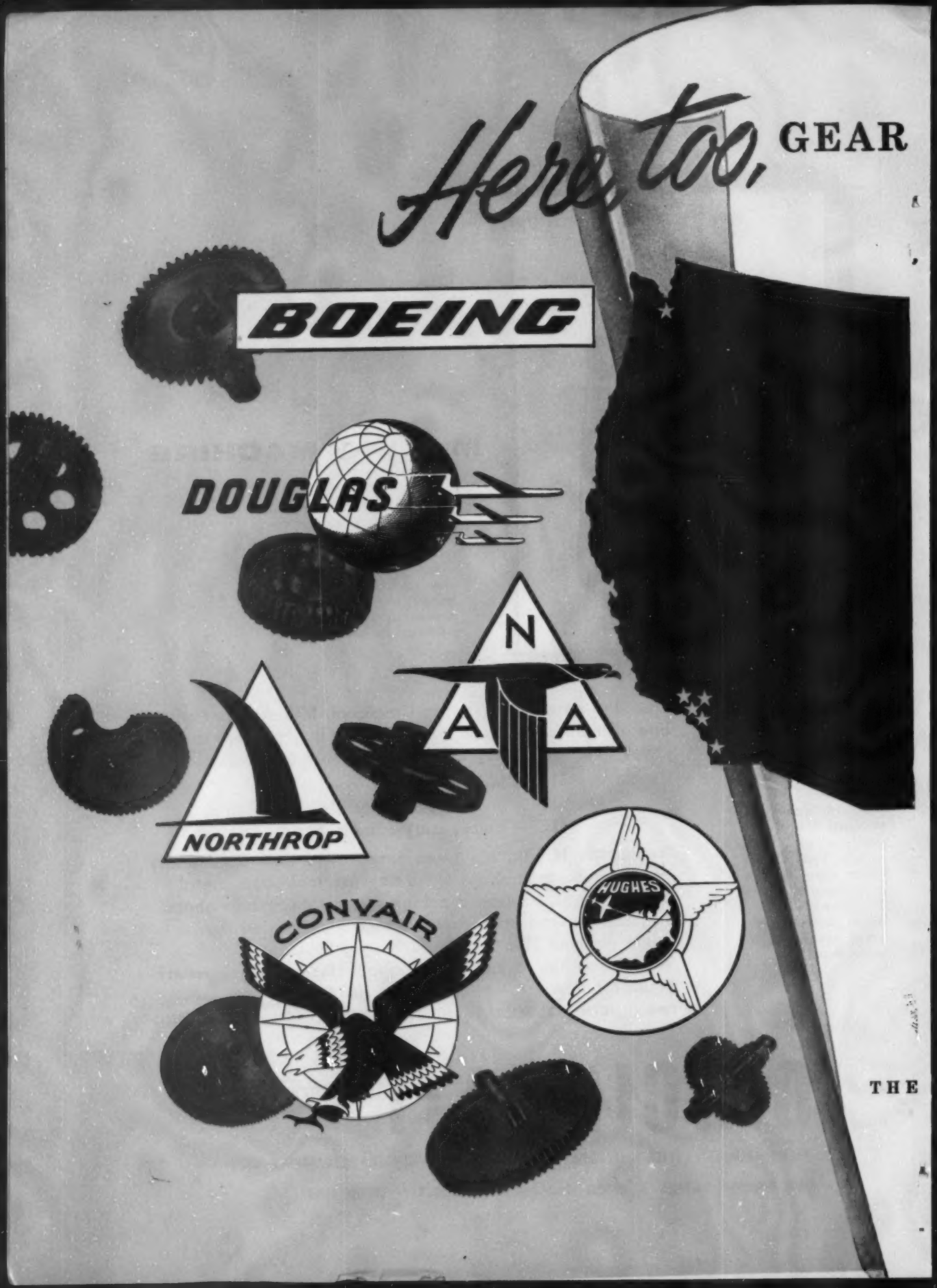
Here, too, GEAR
BOEING
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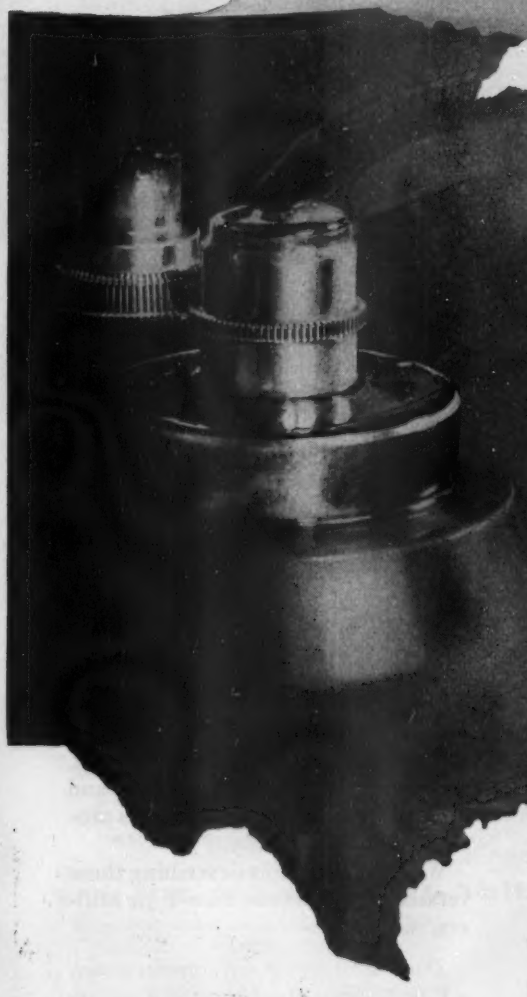
# QUALITY IS MAINTAINED

# *by* THE FELLOWS METHOD



- *Fine-Pitch and Other Gear Shapers*
- *Shaving Machines*
- *Original Fellows Cutters*
- *Involute Inspection Instruments*
- *The "Red Liners"*
- *Lead Checking Instruments*
- *Master Gears, etc.*

The precision standards for fine-pitch instrument gears and for control system gearing in the Aviation Industry, are well served by the control of accuracy *inherent* in the Fellows generating principle.

Fellows machines and tools have demonstrated *here*, as in other industries, their ability to hold costs under control and to work within the most critical tolerances.

For advice on methods, machines, or specific production problems, call on the nearest Fellows office.

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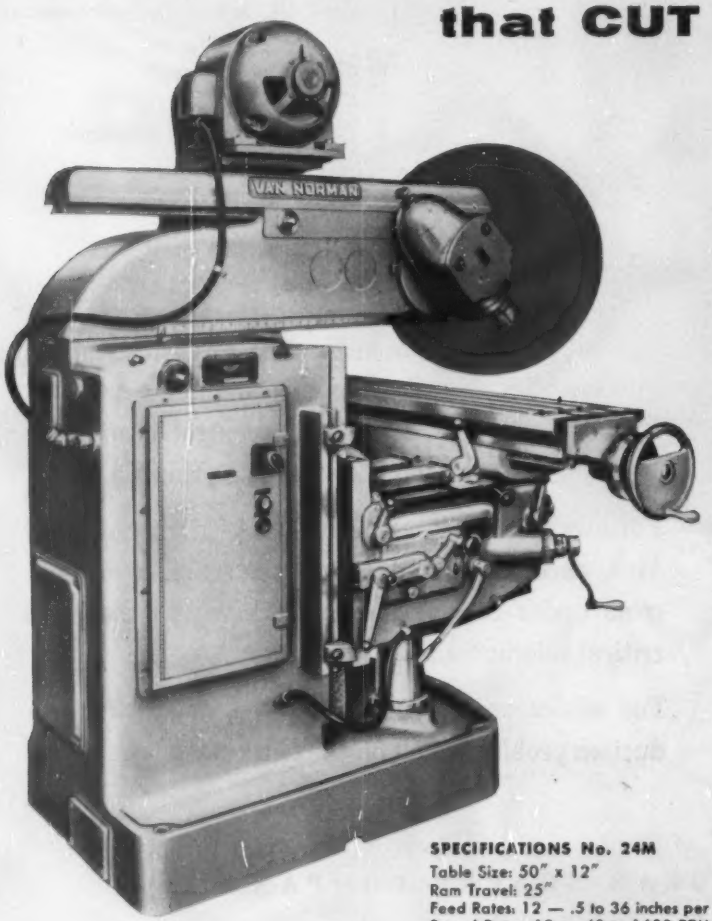
# ...the NEW

## VAN NORMAN Ram-Type Millers

## give you the advantages of

## EXTRA FLEX-ABILITY and CUT-ABILITY

## that CUT milling costs




**SPECIFICATIONS No. 24M**
Table Size: 50" x 12"
Ram Travel: 25"
Feed Rates: 12 — .5 to 36 inches per min.
Speed Rates: 12 — 40 to 1600 RPM
Spindle Motor 5 HP

Van Norman and only Van Norman Ram-Type Milling Machines give you the exclusive advantage of the adjustable cutterheads mounted on heavy sliding rams which provide *maximum flex-ability.* This means you get more production because there is less idle machine time.

And for *more cut-ability* . . . powerful spindle motors with up to 10 HP provide ample power for every milling cut. The extra heavy-duty rams, larger, heavier columns, bases and knee, saddle and table assemblies provide *maximum rigidity.*

Write for Bulletins describing these versatile Van Norman Ram-Type Millers, today.

*Don't wait . . . for extra profits install a Van Norman Machine now! They are available on four purchase plans — Outright sale . . . Purchase on conditional sales contract up to 5 years . . . Straight lease . . . Lease with option to buy. See your dealer or write Van Norman Company.*

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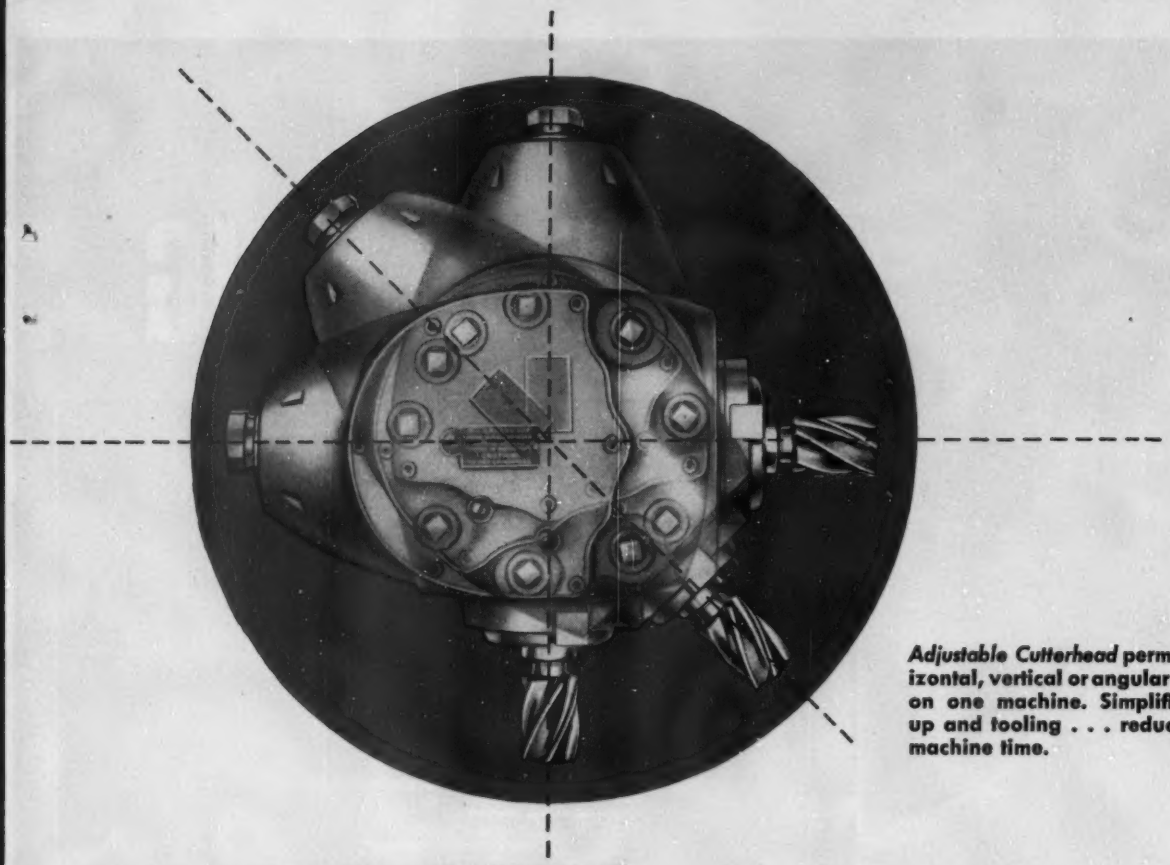
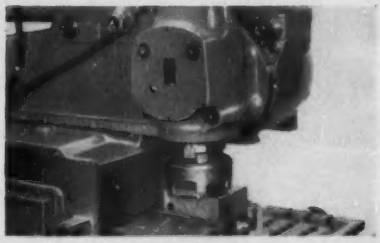
# VAN NORMAN

**MANUFACTURERS of—Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.**

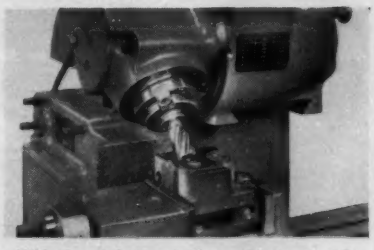


***Adjustable Cutterhead*** **permits horizontal, vertical or angular milling on one machine. Simplifies set-up and tooling . . . reduces idle machine time.**

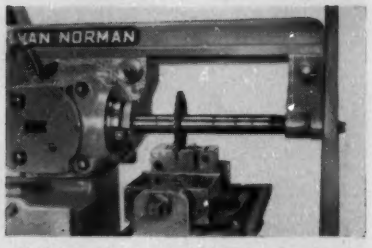
## for greater Flex-Ability



With the cutterhead locked in the vertical position, a vertical milling operation is performed on the workpiece.

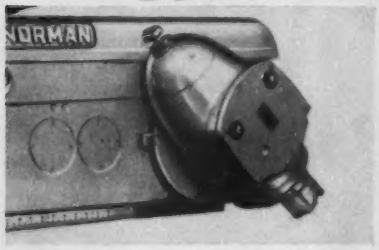


With the workpiece in the same set-up and the cutterhead in angular position, a V is milled in the work. Angular range of cutterhead is 0 degrees to 90 degrees.

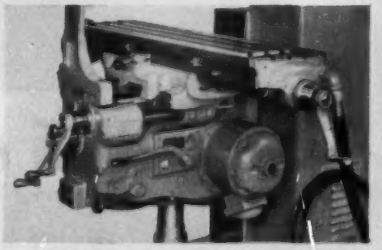



With the cutterhead in the horizontal position, a slot is milled in the work. Note that the set-up has not been changed.

## for greater Cut-Ability




New heavy-duty adjustable cutterhead, mounted on massive ram with 22″ bearing ways on column assures maximum rigidity and accuracy.



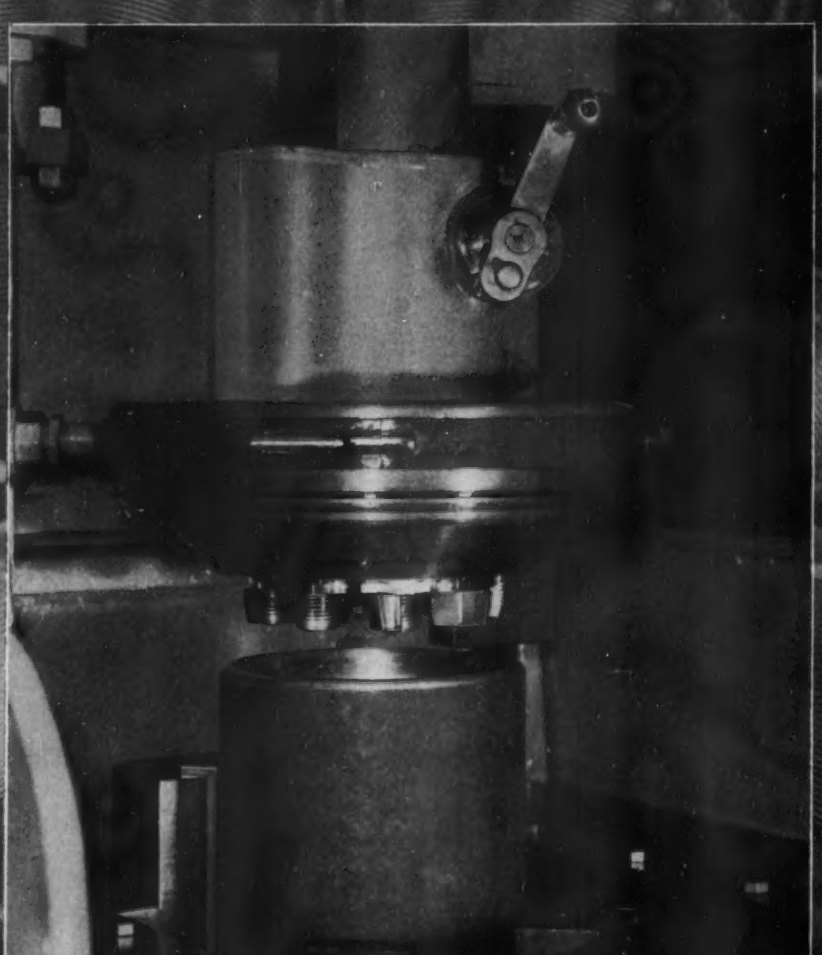
Rugged table, saddle and knee assemblies are designed as an integral unit for rigidity. New heavy motorized knee has direct drive 1HP feed motor.

A heavy horizontal multiple milling cut being performed on the miller. The rigidity of the machine prevents chatter.

# COMPANY

SPRINGFIELD 7, MASSACHUSETTS

# LARGE CASING



THE LANDIS Machine CO.

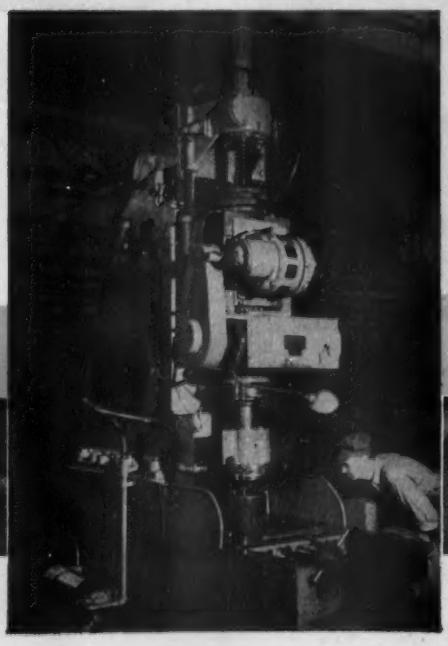
• • • THE WORLD'S LARGEST MANUFACTURERS OF

# THREADS TAPPED IN 12 MINUTES...

BAKER OIL TOOLS, INC., of Los Angeles, California, reports that a *LANDIS* CBLM Circular Chaser Tap mounted on a Stamet's vertical tapping machine has reduced threading time 75%, tapping 6⅝" to 13⅜" diameter threads in casing shoes.

Production examples illustrate the large savings made in threading time: (1) tapping 13⅜" N-80 tubular stock, oil well casing shoe with 8 Pitch API round threads 5" long requires but 12 minutes; (2) tapping a 6⅝" piece with an 8 pitch API round thread 5" long takes only 8 minutes. Formerly, threading a typical casing shoe would have required all of 40 minutes.

The *LANDIS* CBLM Tap, as used at Baker, is designed for use on production tapping machines to thread line pipe, casing, and drill pipe couplings. The tap head is detachable, and with the use of the various size tap heads available, the CBLM Tap will tap threads ranging from 4½" to 13⅜" O.D. It will cut either 3/16", ⅜", or ¾" tapered threads well within all API Standards, and can also be arranged for straight threading. Infinite taper adjustments are possible either above or below the required degree of taper to assure precision accuracy.



*LANDIS* manufactures a wide variety of taps for the economical production of internal threads ranging from 1¼" to 13⅜", either straight or tapered threads, on both stationary and rotating spindle machines. To ensure complete information, please enclose specifications when writing.

LANDIS WAYNESBORO PENNSYLVANIA

THREAD GENERATING EQUIPMENT

# One Machine for all these grinding jobs

**Landis Universal and Tool Grinder**

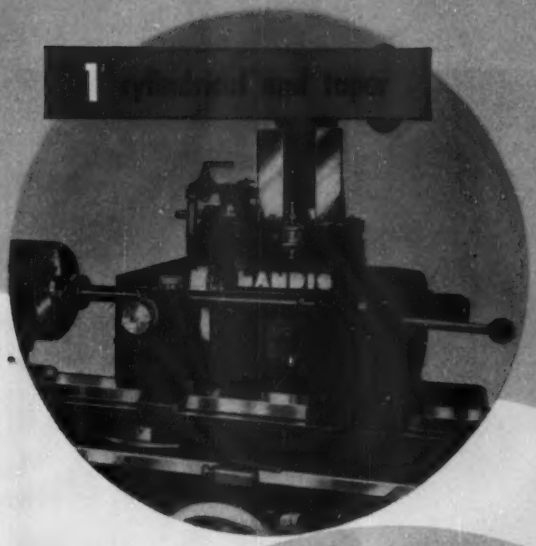
Landis 12" x 28" Universal and Tool Grinder —two machines in one—a tool grinder and a universal grinder. Catalog K - 53

# LANDIS

**precision grinders**

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.

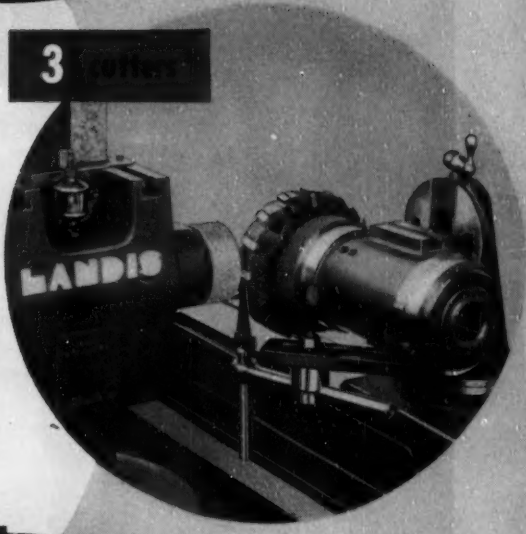
179

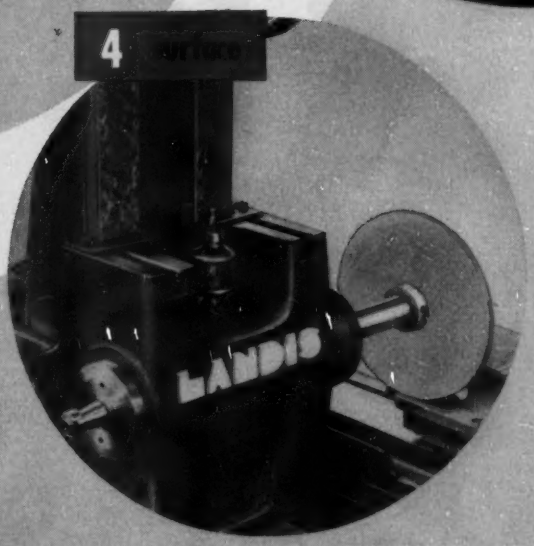


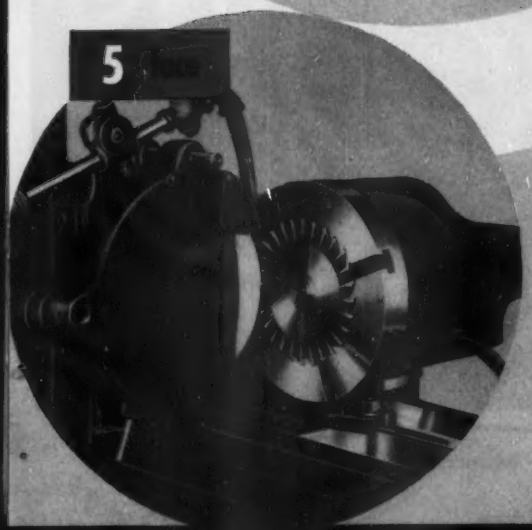
**Also Performs These Grinding Operations:**

6. Clearance on saws, cutters and reamers
7. Flutes on taps
8. Face of teeth on formed cutters
9. Spiral mill grinding
10. Milling cutters
11. Wet grinding
12. Dry grinding
13. Hobs
14. Parallel blocks, flat forming tools and dies
15. Screw machine and other forming tools
16. Angular wheel face
17. Reamers, taps and form cutters
18. Gear cutters
19. Face mills
20. End mills
21. Drills
22. Saws

(All operations can be done with standard and extra equipment)



# Bullseye!...

# on the mark within .0002"

**Here's precision, speed and versatility to perform boring, drilling and milling operations with equally high efficiency. Here's capacity to handle large or small work, simple or complex set-ups, long or short runs. Here's the 350-T, another superlative G&L Horizontal Boring, Drilling and Milling Machine**

As one enthusiastic production engineer put it, "We've found our G&L horizontal bar furnishes faster cutting speeds, heavier cuts, better finishes, greater efficiency and improved operating economy. Its 45 speeds and 36 feeds are so well designed that the machine provides excellent performance for an overall range of milling, drilling and boring practices."

Here briefly are some of the features of this 25 hp, 5" spindle, table-type machine — choice of three basic arrangements of table and saddle; hardened, heavy-duty ways on bed and saddle; rapid, easy speed selection; bed lengths from 96" to 144"; column heights from 48" to 72"; and cross travel ranging from 72" to 120" with saddle supports.

What's more, these versatile machines can be equipped with the G&L Automatic Electric Positioning Device. This unit eliminates many time-consuming hours for final hand adjustments for locating work. That's because it automatically controls table and headstock movements to precise, pre-determined settings.

For complete information, see your G&L representative or write ———

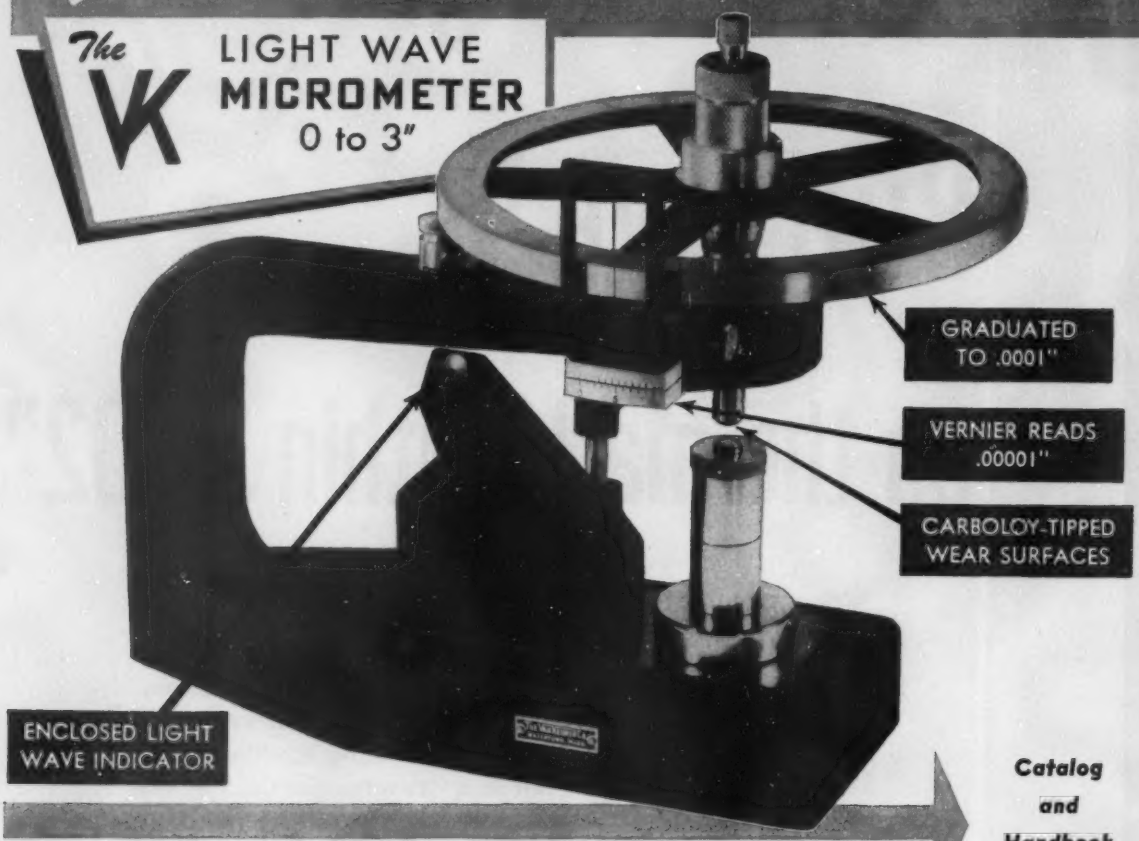
**GIDDINGS & LEWIS MACHINE TOOL CO.**
FOND DU LAC, WISCONSIN

*Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Open Side Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.*

Photo courtesy of Greenlee Bros. & Co.

*for that last hundred-thousandth*

The VK LIGHT WAVE MICROMETER 0 to 3"




The Van Keuren Light Wave Micrometer is an instrument of exceptional accuracy, ideal for measuring plug gages or small precision parts. Use it when you're after "that last hundred thousandth" involved in so many of today's measurements. The 0 to 3" instrument shown above has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy, and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non-parallax vernier index which enables readings to be made to .00001". It has an index lock and carboloy-tipped anvil and spindle. This sturdy, sensitive instrument weighs only 17 pounds, and is in reality a portable measuring machine of inbuilt and sustained accuracy.

The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision . . . fast, accurate and profitable.

**Catalog and Handbook No. 35**

*This 220-page volume represents years of research by the Van Keuren Co. It presents a simple and exact method of measuring screws and worms with wires, tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods. Ask for your copy . . . sent free on request by writing: The Van Keuren Company, 173 Waltham St., Watertown, Mass.*

VK 35th YEAR

THE Van Keuren CO.,

**173 WALTHAM STREET, WATERTOWN, MASS.**

**Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages**

## No other drive does all these jobs like

# Link-Belt SILENT CHAIN

### YES, if you need a drive like any one of these six, you're money ahead with SILENT CHAIN

COMBINING the flexibility and quietness of a belt with the positive action and durability of a gear — Link-Belt Silent Chain offers unmatched advantages for a wide range of drives. Check these reasons why:

- Lower cost—often lower in first cost, always lower in ultimate cost.
- Longer life — trouble-free performance for 25 or 30 years is common.
- No dismantling machine or removing sheaves for repairs.
- Better than 98% efficiency.
- Maintained ratio assures full productive capacity.
- Slipless action assures a better product.
- Easy to install.
- Safe to employees — operates in oil-retaining casing.

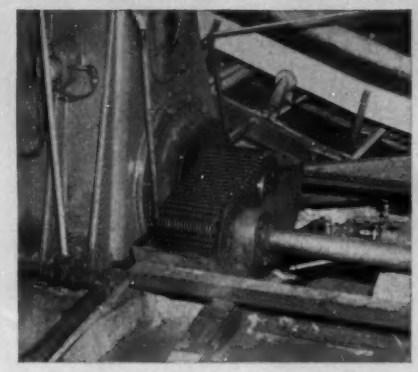
New 88-page Book 2425 gives complete data on silent chain. Ask a Link-Belt engineer or distributor for your copy today.

LINK-BELT

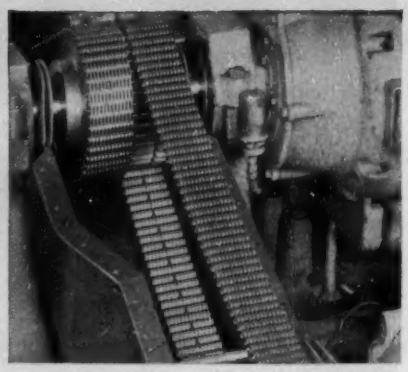
12,902

SILVERSTREAK SILENT CHAIN DRIVES

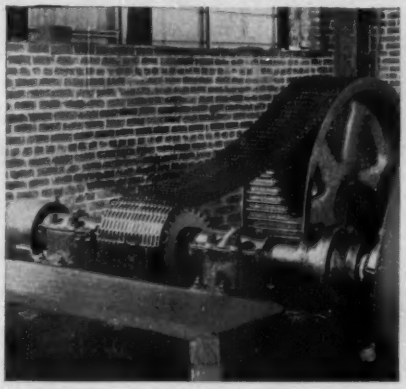
LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.



**1** **Production increased 33%** when speed of this peeler lathe was stepped up by installing two silent chain drives. Neither engine nor lathe had to be moved.

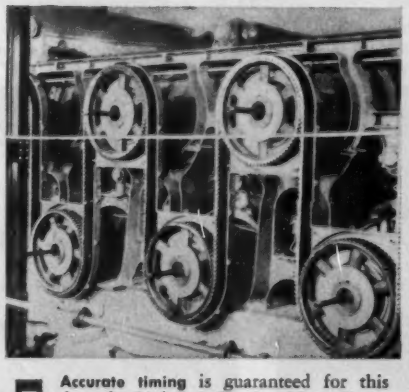


**2** **Constant, high speeds** were assured by equipping each of 48 automotive test stands with two Link-Belt Silverstreak Silent Chain Drives.



**3** **Long life under severe service**—This 250-hp Link-Belt Silent Chain Drive has operated line shaft in cold draw section of seamless tube company since 1916.

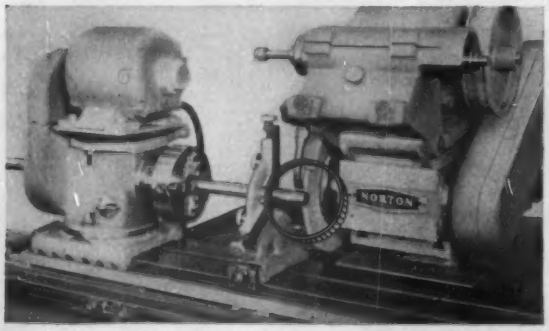
**4** **Fractional hp drives** are positive and dependable with Link-Belt Silent Chain. Above, two 3/16" pitch chains drive machine fabricating refrigerator parts.



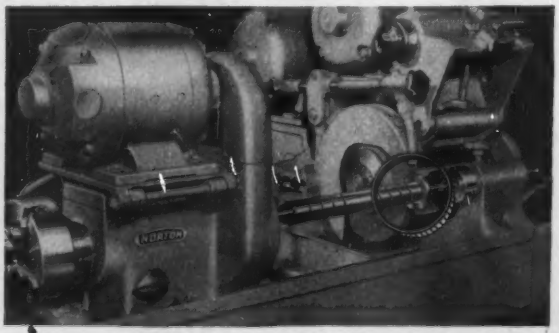
**5** **Accurate timing** is guaranteed for this dryer by Link-Belt Duplex Silent Chain. All shafts travel at uniform angular velocity, permitting precise coordination of process.

**6** **Minimum maintenance**—This is one of 24 Link-Belt Silent Chain beater drives in a pulp mill. All have operated for many years with little attention.

***He can change-over fast*** from this internal grinding set-up on the Norton 10″ x 20″ Universal grinder. The internal grinding spindle, permanently hinged to front of wheel side, swings up out of the way — and he's ready for external, face or angular wheel slide jobs.




***Hollow spindle*** in headstock allows work up to 1″ diameter and longer than machine to be passed clear through.




***Dead center grinding*** — note chuck mounted at opposite end of head, a real set-up time saver.

Quicker set-ups here...

# *increase your profit margin*

## on many different grinding jobs

***Norton 10" x 20" and 10" x 24" Universal Grinding Machines are famous for versatility, accuracy and fast, smooth performance***

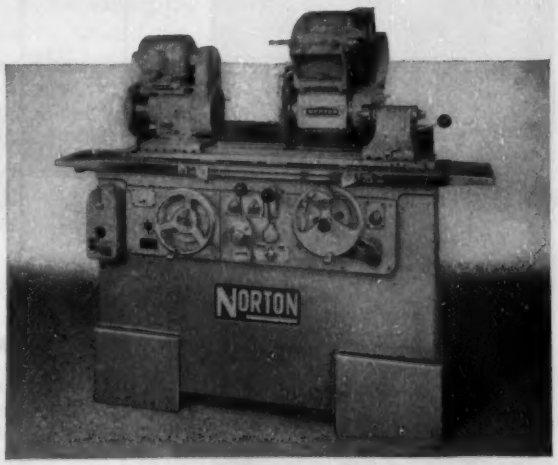
Do you want to save valuable time on many grinding jobs? Want a multi-purpose machine for rough cuts or finest precision finishing?

Then you want the Norton 10" x 20" or 10" x 24" Universal Grinder . . . that helps you produce more work at less cost.

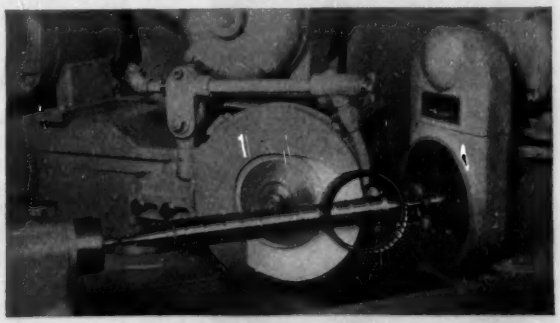
The Norton 10" Universal is a multi-purpose grinding machine that can do external, internal, face and angular wheel-feed grinding.

Head and footstock are interchangeable, permitting simplified set-up on jobs involving shoulders or spacers, especially on angular grinds. Set-ups are made easier on chucking jobs by the D1-3" camlock nose on one end of the headstock spindle, and the provision for permanent chuck mounting. The headstock is easily swivelled 180° to change from dead center to chucking work.

The wide versatility of this machine proves once more that you economize when you modernize with a new Norton machine. For complete information see your Norton representative or write for Catalog 170-3. NORTON COMPANY, Machine Division, Worcester 6, Mass.




*Norton 10" x 20"* Universal Grinding Machine. Wheel head swivels 360°. Internal spindle hinged to front of slide and swings up out of way when grinding external work.



***Head and footstock*** are reversible. No need to change wheel and drive to the other end of spindle.

*To Economize, Modernize With NEW*

**NORTON**

**GRINDERS and LAPPERS**

*Making better products . . . to make other products better*

*District Sales Offices:* Hartford • New York • Cleveland • Chicago • Detroit
*In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5

# Get **more parts** per hour

*Look how* **MX** *has increased production and increased tool life on these typical screw machine parts*

| part | stock size | machine | operations | comparative performance | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | grade | SFM | seconds per part | production increase | tool life increase |
| DRUM NUT | ⅝" round | Acme Gridley | drill<br>rough form<br>turn<br>break down<br>tap<br>finish form<br>cut off | B-1113 | 285 | 3.17 | .... | .... |
| | | | | MX | 345 | 2.86 | 11% | 87% |
| SHAFT | ¼" round | Brown & Sharpe #00 | rough form<br>finish form<br>ream<br>turn<br>cut off | B-1113 | 255 | 7.0 | .... | .... |
| | | | | MX | 277 | 4.5 | 55.6% | 30% |
| WASHER | ¾" round | Brown & Sharpe | drill<br>ream<br>cut off | B-1113 | 172 | 14.2 | .... | .... |
| | | | | MX | 250 | 10.0 | 42.5% | 100% |
| PULLEY | 1⅜" round | Brown & Sharpe G-2 | center drill<br>recess, drill<br>tap<br>thread<br>form<br>face<br>cut off | B-1113 | 245 | 35 | .... | .... |
| | | | | MX | 312 | 27.5 | 27% | 25% |

# and longer tool life

# ...do the job with MX

*the freer-machining screw stock*
*available in both Bessemer and Open Hearth*

Make a note of this: USS Free-Machining MX Steels *have been successfully machined at speeds approaching 350 SFM.*

A broad appraisal of all screw machine operations shows that the *average* speeds used are under 250 SFM and that only a small percentage of parts are machined at speeds in excess of 300 SFM.

So unless you are operating at the highest speeds—and comparatively few shops are—you simply don't need and can't take advantage of any greater machinability than MX offers.

Remember that USS Free-Machining MX is designed to ensure *maximum* cutting speeds compatible with *economical* tool life. And it does. Wherever fast-cutting MX is put to work, production goes up and costs come down. From results obtained in shops that have used MX in more than a billion parts of many different kinds, we feel sure that MX will cut the cost of *any* part you now machine from ordinary screw stock. It does this in four ways.

By increasing the rate of production, *MX lowers the cost per part.* By prolonging tool life, *MX reduces down time.* By assuring better part finish, *MX often eliminates extra finishing operations.* By providing closer dimensional accuracy, *MX helps to minimize rejections.* In short, USS Free-Machining MX offers you greater economy and greater efficiency in your machining operations.

In view of these facts we suggest that you carefully review your screw machine operations. If you normally operate at speeds lower than 350 SFM, your best bet is USS MX, either Bessemer or Open Hearth. You'll be money ahead – get more parts per hour, longer tool life and better parts—if you use MX, which you can buy at the *same* price you pay for comparable grades.

USS Free-Machining MX is produced in all the popular screw stock sizes. It is sold in cold-finished form by your regular supplier either as "MX" or under his own identifying trade name. In hot-rolled form MX is available through our nearest district sales office.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

UNITED STATES STEEL

# You can't shut that machine down now!

But it might be a lot more profitable for you if you did!

The pressure to meet a production schedule often seems to dictate, "no time for maintenance." So it's postponed, or neglected altogether. You know the results. Accuracy begins to slip. The machine's production rate isn't what it was, or should be. Then, all too often, a major breakdown occurs—one that could have been prevented by correcting minor troubles before they became major problems.

The resulting downtime costs you money. It digs into profits, because downtime boosts your *cost per piece*. Certainly it costs more than the comparatively little production you lose during regular maintenance and inspection.

Every machine tool we build has years and years of dependable, high-precision productivity built into it. And we know that a *scheduled preventive maintenance program* extends its productive life, reduces service and repair costs, and minimizes downtime—giving you lower-cost, *more profitable production!*

For that reason we consider it our *responsibility* to help you every way we can to provide proper maintenance for your Warner & Swaseys. And here are three ways we can help you now:

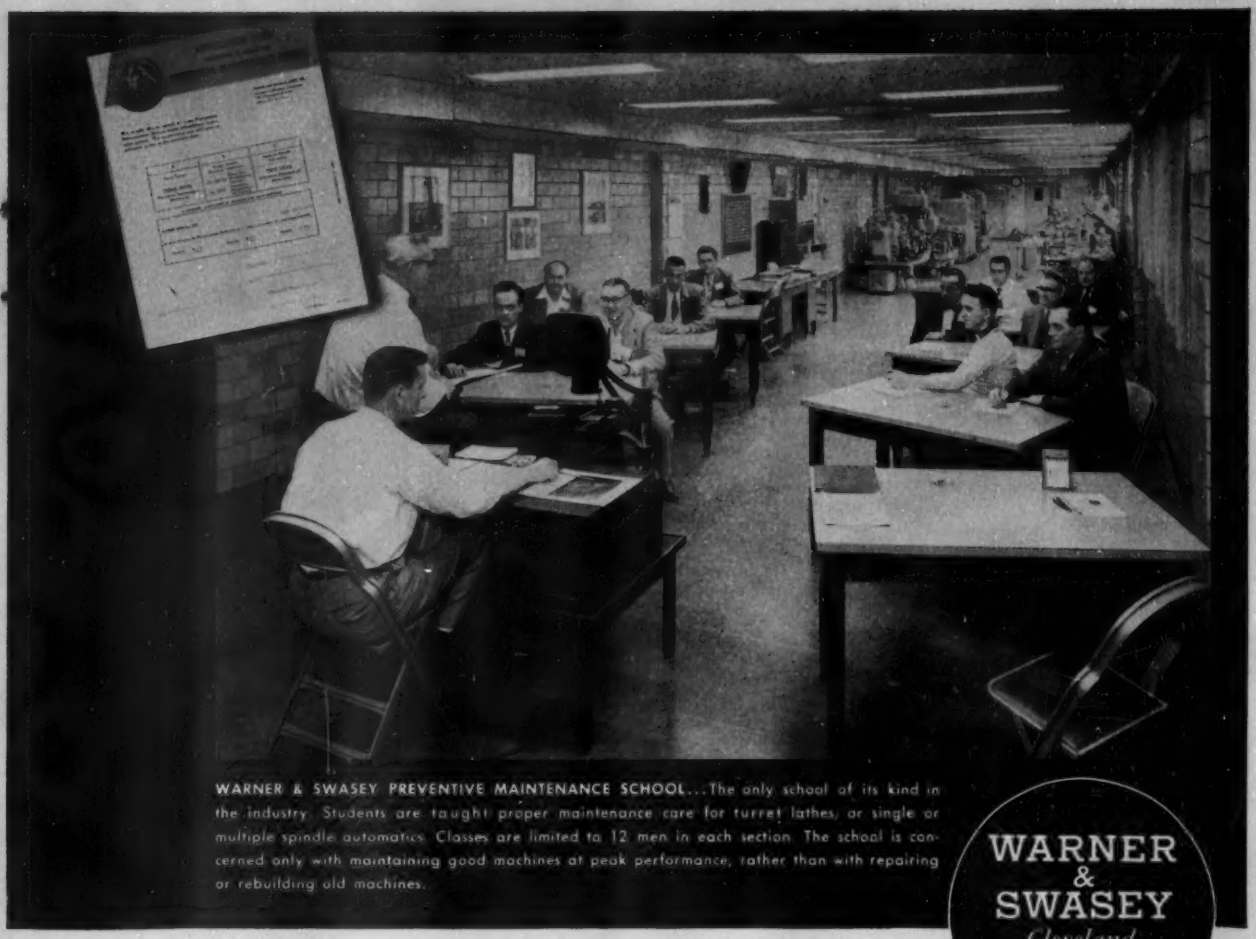
1. A preventive maintenance booklet, "How to Take Care of Your Turret Lathe," gives details on adjustments, lubrication, timing and cleanliness, along with a check-list schedule. It is widely used in plants throughout the country, and will help you organize a maintenance schedule that will pay off in more efficient turret lathe production.

2. A Preventive Maintenance Chart is also available. You'll want one of these charts near every Warner & Swasey Turret Lathe in your plant to assure its getting the thorough, periodic going-over a high-precision machine deserves.

3. We also invite you to enroll your men who service Warner & Swasey machines in the Warner & Swasey Preventive Maintenance School in Cleveland—the *only* school of its kind in the industry. It's an intensive course, either on turret lathes or automatics. Your representative can learn exactly how to keep your Warner & Swaseys at top performance, how to institute a preventive maintenance program in your plant, and be prepared to instruct others. More than 500 "graduates" tell us it is well worth the time and nominal expenses involved.

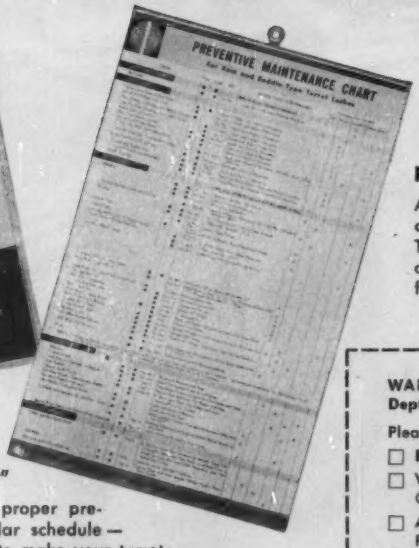
Use the coupon at the right to send for the Warner & Swasey preventive maintenance aids or enrollment forms you need.

**YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS,**



**WARNER & SWASEY PREVENTIVE MAINTENANCE SCHOOL**... The only school of its kind in the industry. Students are taught proper maintenance care for turret lathes, or single or multiple spindle automatics. Classes are limited to 12 men in each section. The school is concerned only with maintaining good machines at peak performance, rather than with repairing or rebuilding old machines.

WARNER & SWASEY
*Cleveland*
PRECISION MACHINERY SINCE 1880




**"HOW TO TAKE CARE OF YOUR TURRET LATHE"**

A 20-page booklet devoted to proper preventive maintenance on a regular schedule — to avoid unnecessary downtime, to make your turret lathe more productive, longer. Well illustrated, it explains in detail many of the less familiar points on preventive maintenance. It will help you set up a good system of periodic care that fills the requirements of your shop.

**PREVENTIVE MAINTENANCE CHART**

A convenient check list for daily, weekly, monthly, and less frequent maintenance for Warner & Swasey Turret Lathes. It covers adjustments, lubrication, cleaning, and other information. In handy wall chart form, for use as a guide and maintenance reminder.

AM-11-54

**WARNER & SWASEY COMPANY**
**Dept. 320, Cleveland 3, Ohio**

Please send me the following free Preventive Maintenance aids today!

- ☐ Booklet, "HOW TO TAKE CARE OF YOUR TURRET LATHE."
- ☐ Warner & Swasey Turret Lathe PREVENTIVE MAINTENANCE CHART.
- ☐ Application form and more information on Warner & Swasey PREVENTIVE MAINTENANCE SCHOOL.

*Name* _____

*Company* _____ *Position* _____

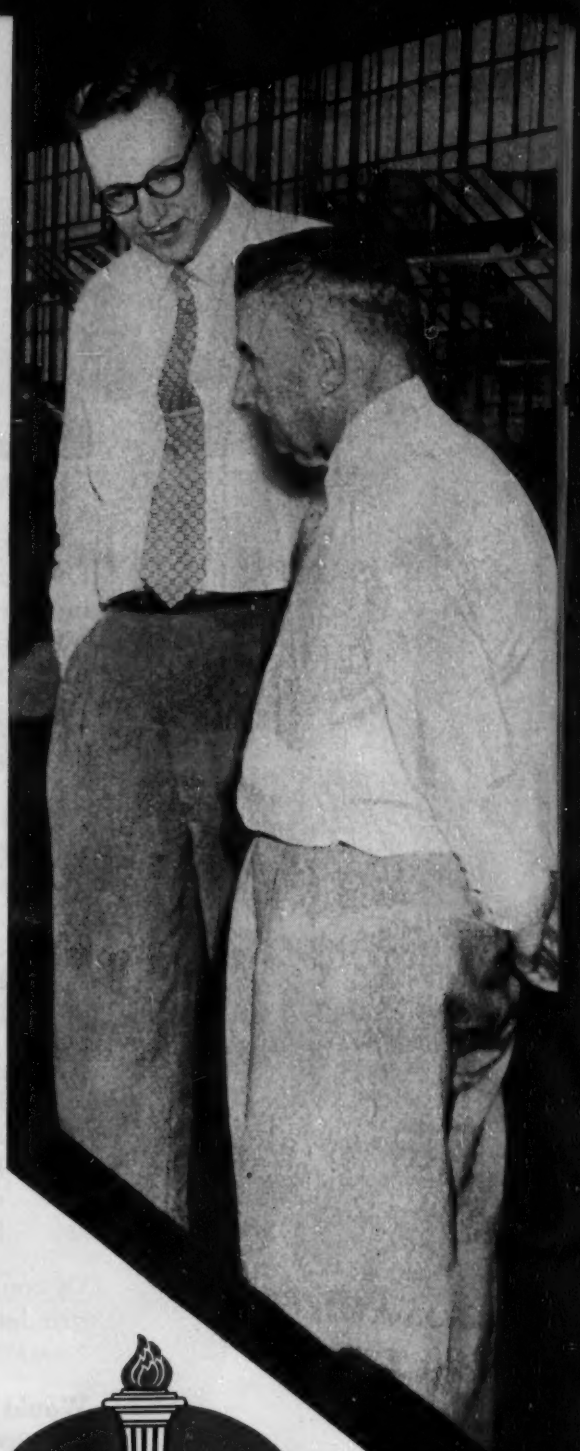
*Address* _____

*City* _____ *Zone* _____ *State* _____

**TEXTILE MACHINERY, CONSTRUCTION MACHINERY**

STANWAY
INDUSTRIAL
OILS

# How a little talk
## (with the right person)
## stopped a lot of chattering



● Chattering and scoring of ways was causing trouble for the Elkin Tool and Manufacturing Company of Detroit. The trouble was noted on a big planer operating under extremely heavy loads.

Here's how a little talk with the right person helped clean up the trouble. A Standard Oil lubrication specialist was consulted and he recommended the use of STANWAY No. 95, a good stable oil having extreme oiliness and containing a tackiness agent. Result: smooth operation, complete elimination of chattering and scoring.

STANWAY Industrial Oils were developed to meet the extreme oiliness requirements of certain machine tools customarily operating under very heavy loads. They are also recommended for other severe operating conditions where sliding friction poses a lubricating problem. STANWAY Industrial Oils are part of a complete line of industrial oils, cutting oils and coolants that serve all industry.

No matter how special your problem may be, there's a Standard Oil product to solve it. There's also a near-at-hand Standard Oil lubrication specialist to help you select and apply the right one. To obtain his services call the Standard Oil office nearest you, or write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

**The right person in this case was E. F. Aschemeyer, typical member of the corps of lubrication specialists located in Standard Oil offices throughout the Midwest. Aschemeyer put his practical experience and special training to work to help the Elkin Company solve *their* problem successfully. You too, can get this kind of expert help on your lubrication problems when you call Standard.**

STANDARD

**STANDARD OIL COMPANY**

*(Indiana)*

# Introducing the New CINCINNATI FILMATIC No. 2

Over thirty years of experience in building and tooling thousands of centerless grinding machines has guided the design and construction of the new CINCINNATI FILMATIC No. 2 Centerless.

**No other machine tool manufacturer has this extensive centerless experience.**

The new CINCINNATIS are more efficient, more accurate, more versatile than ever before. Time-proved Cincinnati advantages have been retained . . .

**Bed-rock grinding wheel spindle mounting**
**Filmatic grinding wheel spindle bearings**
**Lower slide construction for workrest**
**Simplified method of truing regulating wheel**

And now these additional advantages are included . .

**Infinitely variable regulating wheel speeds**
**Pre-loaded, precision ball bearing lower slide**
**Pressure lubrication of regulating wheel spindle bearings**
**Stabilized infeed screw**

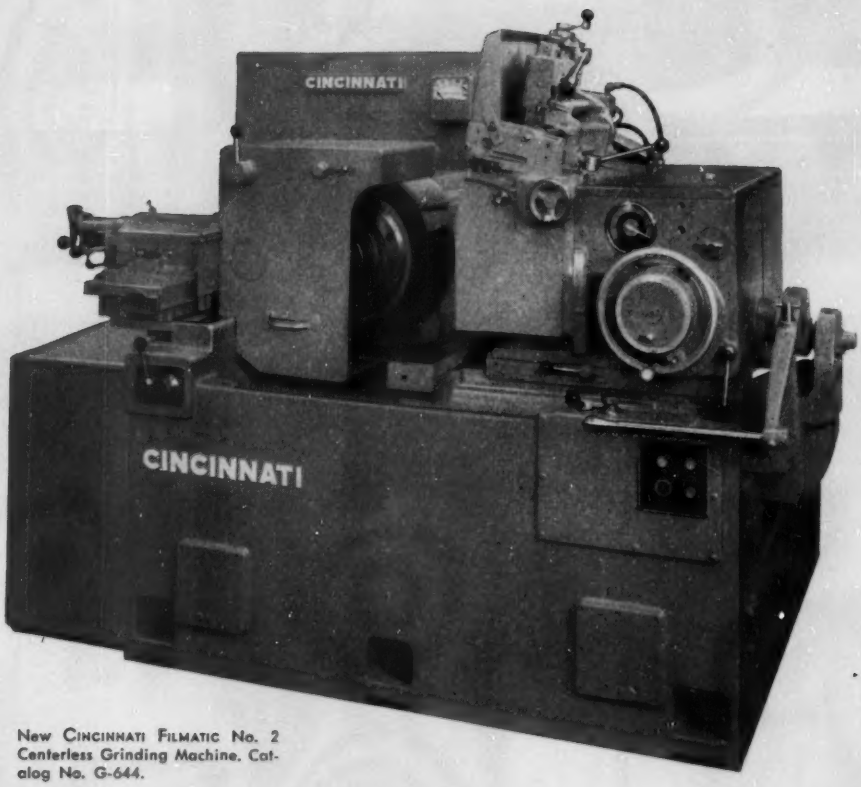
Of course, many more features desired by centerless grinder users are incorporated in the new CINCINNATI FILMATIC No. 2 Centerless Grinder.

Would you like to know more about them? Write for new catalog No. G-644.

**CINCINNATI GRINDERS INCORPORATED**
**CINCINNATI 9, OHIO**

# CINCINNATI

# CENTERLESS GRINDING MACHINE

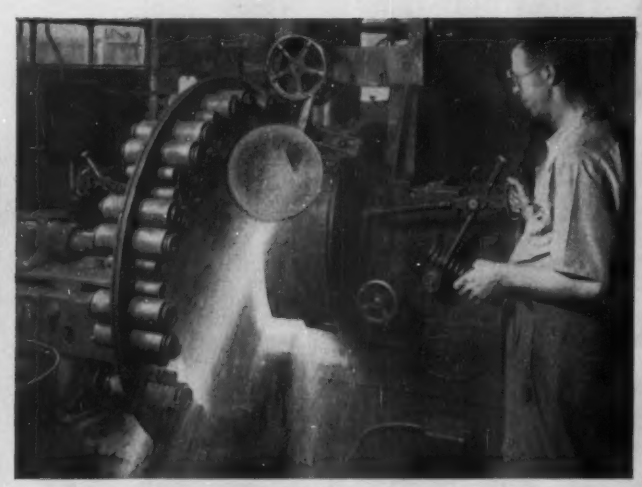



New CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. Catalog No. G-644.

**CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES**

CINCINNATI

# *Norton covers the entire*



# *disc grinding range*

## Norton discs are engineered for every type of grinding, on all materials, all machines— to bring you the profit-boosting

## "TOUCH of GOLD"

Your disc grinding operations may be anything from snagging to lapping, single or double surfacing, on large or small areas, dry or wet grinding.

Your materials may be metallic or non-metallic, hard or soft, ferrous or non-ferrous, alloys or machine steels.

Whatever your requirements, Norton will meet them exactly — with discs engineered for coolest cutting action and longest, most productive service life. Norton discs of ALUNDUM* and CRYSTOLON* abrasives are made in all grit sizes, all grinding grades, five types of bonds and all types of mountings. They are precision-built, by exclusive Norton processing, to assure closest uniformity of grinding action from disc to disc and lot to lot. Which means that each time you re-order to the the same specifications, you'll get the same top performance — next week, next month or next year.

*See Your Norton Distributor*
for practical aid in selecting the Norton discs that will add the money-saving "Touch of Gold" to every disc grinding job you do. Ask him for the new booklet, "Disc Grinding." Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

***What Norton discs have done for others is good evidence of what they can do for you. Check these reports, typical of many from present users:***

**"Best discs ever received. Produced over 6,000,000 piston rings — 100% more than our former discs, with 50% less dressing. Results duplicated in subsequent shipments."**

---

**"Outlasted and outperformed all other discs — gave 366,975 pieces without burn."**

---

**"Averaged 21,500 pieces, a new high for this job."**

---

**"Outproduced previous discs 2 to 1."**

---

**"High above competition for output and grinding quality."**

---

**"Gave 20% longer service life."**

W-1583

*Making better products . . . to make other products better*

NORTON

***and its BEHR-MANNING division***

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

Added Evidence that . . .

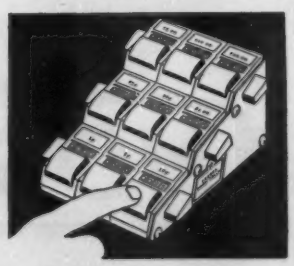
## Everyone Can Count on VEEDER-ROOT

In figuring out new systems of automatic electrical control, Veeder-Root *Countrol* can supply vital connecting links. For instance, this Predetermining Counter can be hooked into such a system to light a light, ring a bell, or actuate a mechanism to stop a machine or process *at any pre-set point.* And there are many other Veeder-Root Counters that can serve as "countponents" in almost any way desired. Or special counters can be designed for specific applications. Engineers in any industry, now engaged in working out automatic control systems, can count on Veeder-Root engineers to work with them on any problem where reliable facts-in-figures are needed.

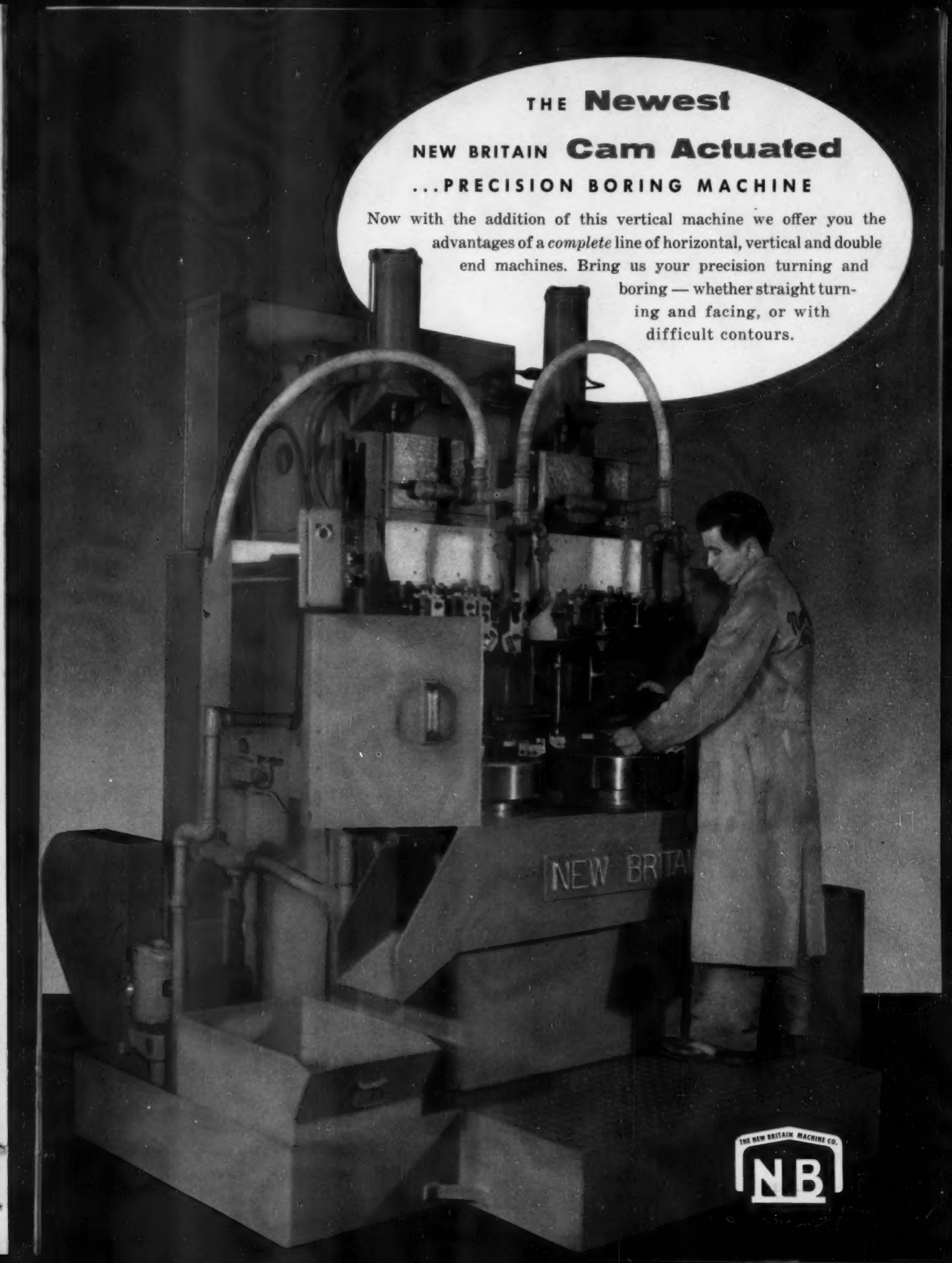
**VEEDER-ROOT INCORPORATED • Hartford 2, Connecticut**

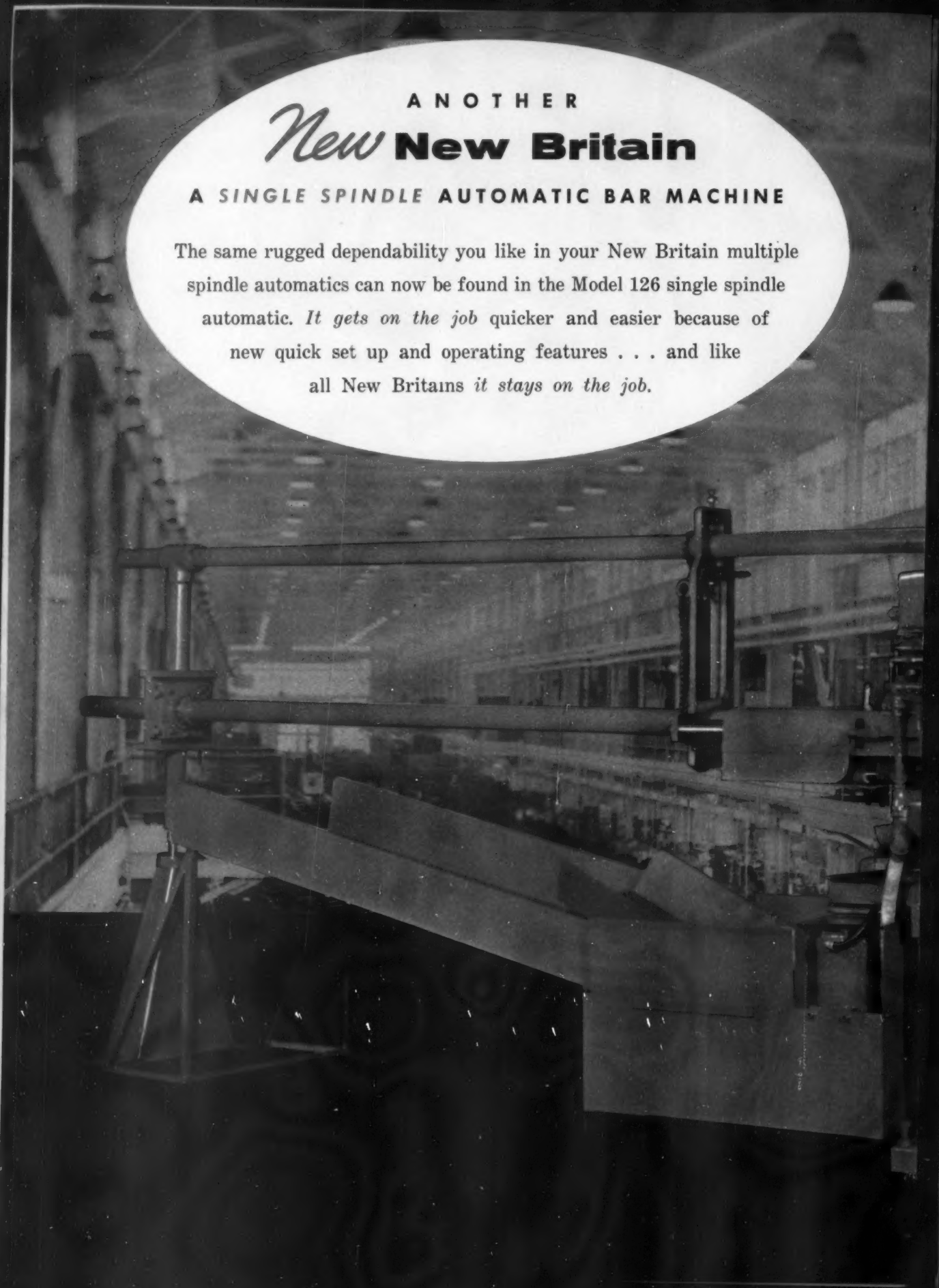
Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C. • Montreal 2, Canada
Dundee, Scotland • Offices and Agents in Principal Cities

**"The Name That Counts"**



New *Vary-Tally* Multiple-Unit Reset Counter comes in any combination up to 6 banks high, and 12 units wide Write for news sheet and prices.


THE Newest
NEW BRITAIN Cam Actuated
...PRECISION BORING MACHINE
Now with the addition of this vertical machine we offer you the advantages of a *complete* line of horizontal, vertical and double end machines. Bring us your precision turning and boring — whether straight turning and facing, or with difficult contours.
THE NEW BRITAIN MACHINE CO.
NB



ANOTHER

# *New* New Britain

## A *SINGLE SPINDLE* AUTOMATIC BAR MACHINE

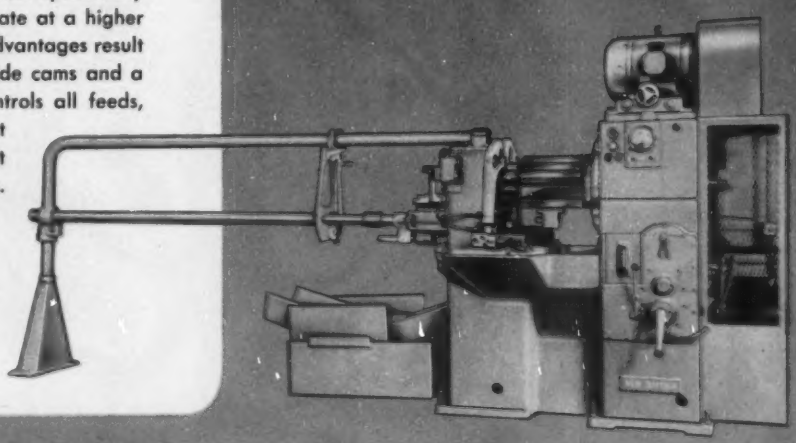
The same rugged dependability you like in your New Britain multiple spindle automatics can now be found in the Model 126 single spindle automatic. *It gets on the job* quicker and easier because of new quick set up and operating features . . . and like all New Britains *it stays on the job.*

New Britain
Automatics

**NEW BRITAIN CAM-CONTROLLED PRECISION BORING AND TURNING MACHINES** reproduce size and finish with absolute certainty, piece after piece, hour after hour, day after day. The model illustrated generates all types of radii, chamfers, undercuts, grooves, faces, etc.; plus straight boring and turning. This simple, accurate high speed machine reduces manufacturing costs on a wide variety of sizes and types of piece.

**NEW BRITAIN DOUBLE END TOOL OR WORK ROTATING PRECISION BORING MACHINE** specifically designed for products requiring the most exacting accuracy at high production rates. Tooling set ups and types of pieces machined are practically unlimited. Both double end and single end jobs can be profitably produced on this machine by the use of its automatic cycling features.

**NEW BRITAIN MODEL 126 SINGLE SPINDLE AUTOMATIC** was designed specifically to reduce "down time" and operate at a higher percentage of efficiency. These advantages result from pre-set wedge-type cross slide cams and a central program drum which controls all feeds, speeds and sequences. Inherent simplicity and adaptability make it ideal for both long and short runs.



*Our general catalog is filed in the Sweet's Machine Tool Catalog File.*

AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES
LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES
NEW BRITAIN +BF+ COPYING LATHES

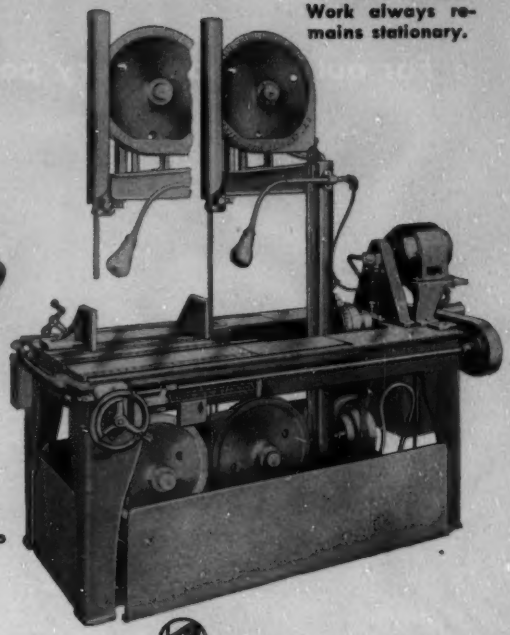
# The NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut

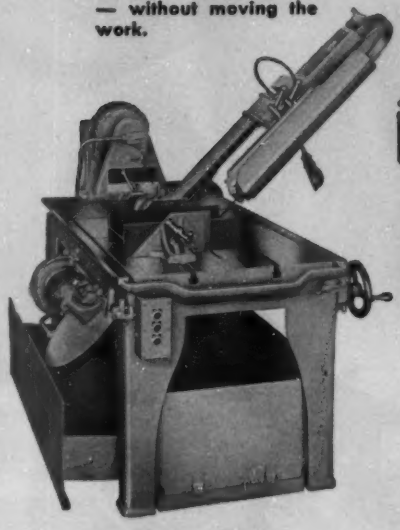
# Never Confuse the No. 8 MARVEL with an ordinary Band Saw

## ...only the MARVEL is Universal

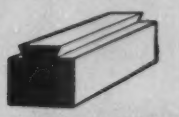
Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a ⅛" rod or cut-off an 18" x 18" cross section



Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

### "Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL Metal Cutting SAWS

Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

# IT'S THE NEW, "YEARS-AHEAD" LINE...

*Far out front on every point of comparison*

COMPLETE LINE FROM 50 TO 775 TONS

NIAGARA MACHINE & TOOL WORKS 1879 75 1954

*America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work*

# ... NIAGARA

# ALL STEEL PRESS BRAKES

### "MULTI-MACHINE" VERSATILITY TO BOOST PRODUCTION

Practically limitless in their scope of forming, bending, punching, blanking and related operations, Niagara Press Brakes get more done for you because they do more jobs. One reason: Advanced design. Another: The extensive line of Niagara Press Brake Dies available.

### UNIFORM BENDS WITH STRAIGHT-EDGE ACCURACY

Double end twin drives with double reduction gearing, *on all models*, provide uniform, constant application of power at both ends of the ram. Off-center loading presents no problem.

Rugged, streamlined frames feature box type crowns of unequaled strength and rigidity, assuring maximum resistance to deflection and permanent alignment of bearings and ram.

### 3-SHIFT STAMINA TO HANDLE WORK-HEAVY SCHEDULES

Close attention has been given to every design detail. Nothing has been overlooked. Each frame size has been scientifically tested to detect and eliminate harmful stresses at all critical points.

Laminated non-metallic ways, an exclusive Niagara feature, reduce wear to an absolute minimum, providing accurate alignment and longest possible service life. All gearing is totally enclosed in sealed oil baths for thorough, clean lubrication.

Once again, Niagara's forward-thinking engineering has produced a metal working machine years ahead of its time. As you become familiar with the significant developments embodied in this revolutionary new line of all steel press brakes, you will realize why it carries the Niagara nameplate. After all, who is more uniquely qualified to be its builder than the builder of America's most famed and most complete line of presses, shears, other machines and tools for plate and sheet metal work?

Call in your nearest Niagara representative at once. Let him tell you, *in detail*, what these great, new press brakes can do for you.

### CHECK ALL THE FACTS, YOURSELF!

**Compare. Make a careful, feature-by-feature appraisal of Niagara's years-ahead press brake design. Write for new Bulletin 89C . . . the most comprehensive press brake literature ever published.**

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**BUFFALO 11, N. Y.**
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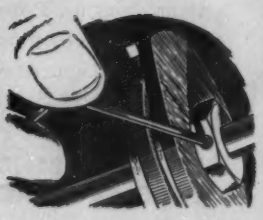
## engineered to expand your output ...AT SAVINGS!

UNBRAKO Self-Locking Socket Set Screws are used to hold the Vernier-Set or Cycle-Progress cam on the shaft of this precision timing device. Once they are tightened, they maintain the accurate setting so important to the operation of the instrument.

Because they are so tiny, the UNBRAKO set screws are picked up and started in the tapped hole with the long arm key.



The compactness of the design of the timing device makes it necessary to turn the screw in prior to assembly. The uniform depth and size of the hex socket permit maximum torquing, speed assembly.

UNBRAKOS—made of heat treated alloy steel—have fully formed threads, Class 3 fit; have knurled cup point for positive locking. Are available in standard sizes from #4 to 1".

# You can lower your inventory by using UNBRAKO Standards—stocked by your distributor

You'll have less money tied up in inventory, you'll get personalized service, faster deliveries. In addition, you'll reduce assembly time and increase production with these precision industrial threaded fasteners. Write for UNBRAKO Standards—a complete listing of socket screw products made by SPS and stocked by your local distributor. STANDARD PRESSED STEEL CO., Jenkintown 1, Pa.

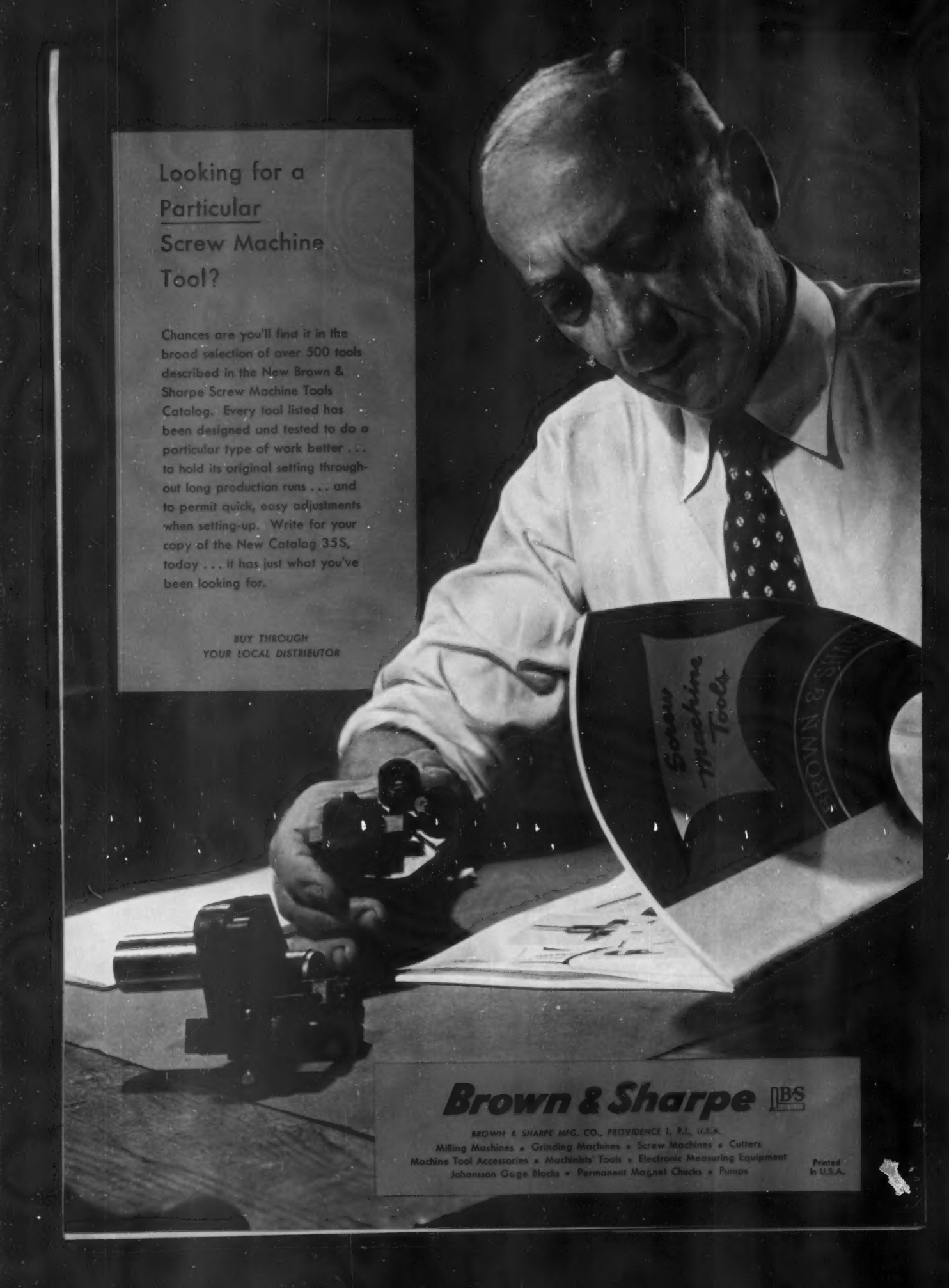
UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

## Speedier Set-ups and Output of Medium-sized Screw Machine Work . . .

The No. 4 Automatic, like all Brown & Sharpe Automatic Screw Machines, incorporates the most advanced features for high-speed, repetitive production to extremely close tolerances. In addition, it provides you with many set-up advantages of real importance: turret tools, for example, need not be set to exact distances—the No. 4 has an independent, adjustable stop for each turret position. Moreover, a separate motor for the operating mechanism can be "jogged" to facilitate positioning of tools—or a complete cycle of operation may be run through by hand. Investigate all its advantages and you'll agree: the No. 4 is the production leader in the medium-size class—an important contribution to the metalworking industry. Write for complete Bulletin.

**Brown & Sharpe**


Looking for a Particular Screw Machine Tool?
Chances are you'll find it in the broad selection of over 500 tools described in the New Brown & Sharpe Screw Machine Tools Catalog. Every tool listed has been designed and tested to do a particular type of work better . . . to hold its original setting throughout long production runs . . . and to permit quick, easy adjustments when setting-up. Write for your copy of the New Catalog 35S, today . . . it has just what you've been looking for.
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Machine Tool Accessories • Machinists' Tools • Electronic Measuring Equipment
Johansson Gage Blocks • Permanent Magnet Chucks • Pumps
Printed in U.S.A.

**Designed to help skilled hands deburr, fit dies and parts and sharpen tools!**

## INDIA* and HARD ARKANSAS* OILSTONES

Master mechanics, tool and die makers prefer these oilstone files because they're all file, they retain their shape, and they cut sharp after constant use. This assures smooth precision cuts without damaging or scratching the work. They're available in a wide variety of shapes and sizes to fit the most intricate surfaces. For that final touch of accuracy, insist on INDIA Oilstones (for general stoning) and HARD ARKANSAS Oilstones for super-fine finishes.

### GET THIS FREE FILE DATA

Catalog No. 54 is an excellent reference for file selection and application. It contains the full BEHR-MANNING Oilstone line. Write for your free copy today. Address BEHR-MANNING, Troy, N. Y., Dept. AM-11.

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® * Trade Marks

BEHR-MANNING
CORPORATION
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES

O-1

# Universal collapsing tap parts of **MAX-EL** alloy steel finish machined after full heat treatment

Considerable machining is required in the manufacture of parts for these taps. That's why Crucible MAX-EL® 3½ free machining alloy steel was chosen by the Geometric Tool Company, Division of Greenfield Tap and Die Corporation. For with MAX-EL you can rough machine, *then* heat treat even intricate parts before final machining *with no danger of distortion of the steel*.

But the best way to check the advantages of MAX-EL is to try it in your own shop. Like many other users you'll appreciate its superior machinability, freedom from distortion, deep hardenability characteristics, uniformity and quality. And you'll like the longer tool life you get by using MAX-EL.

For complete data . . . and *quick delivery* of MAX-EL alloy steels *call Crucible.*

**CRUCIBLE** first name in special purpose steels

54 years of Fine steelmaking **ALLOY STEELS**

**CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.**

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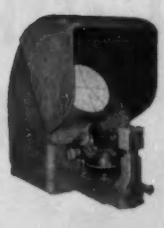
11 MODELS

3 SCREEN SIZES

Pedestal Type
14" Diam. Screen



Bench Type
14" Diam. Screen
4 Models

Bench Type
5¾" x 7¾" Screen
3 Models

## Unsurpassed Inspection Versatility

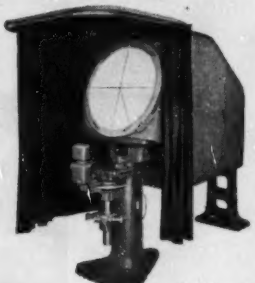
# JONES & LAMSON OPTICAL COMPARATORS

## The Essence of Quality Control

Jones & Lamson Optical Comparators are designed and built like rugged machine tools to withstand vibration and hard use. Yet they have the built-in accuracy to satisfy the most exacting laboratory standards.

- **They meet** the requirements of toolroom, laboratory and production inspection.
- **They precisely measure** height, depth, lead or spacing, as well as angles to degrees and minutes. They will measure to .0001".
- **They compare** intricately contoured parts with a master outline—and measure the amount of error.
- **They are convenient** to operate, easy to set up and read direct—*without computation.*
- **They operate** under normal lighting conditions. *No darkroom is needed.*
- **They will photograph** the enlarged shadow and record its relationship to a master chart.
- **Several persons** may study the shadow *at the same time.*
- **They will inspect** and measure surface contours, as well as profiles of objects such as type faces, stamping dies, punches, worn tools, etc.

Vertical Type
14" Diam. Screen



Direct
Projection
Type

Pedestal Type
30" Diam. Screen

P.S. A complete line of STANDARD CHARTS and FIXTURES is maintained by us.

**JONES & LAMSON** *Machine Tool Craftsmen Since 1835*

**JONES & LAMSON MACHINE COMPANY**
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J&L **COMPARATOR DIV.**
Dept. 710

**Jones & Lamson Machine Company**
502 Clinton Street, Dept. 710
Springfield, Vermont, U. S. A.
*Please send Comparator Catalog No. 402.*

NAME_____ TITLE_____

COMPANY_____

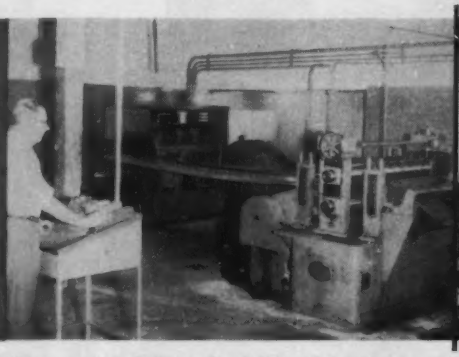
STREET_____

CITY_____ STATE_____

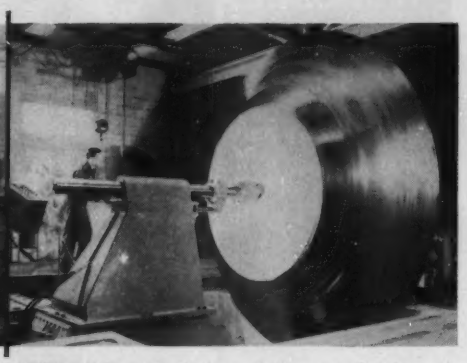
## Precise Control of Speeds Means

# Better Control of Production Processes

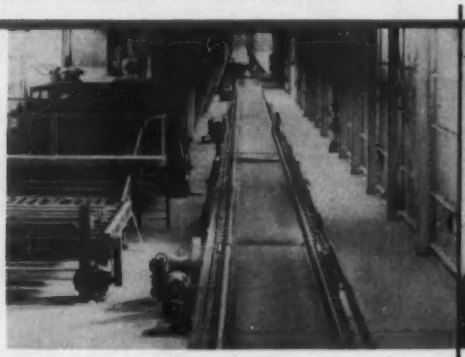
**These Applications Are Typical of the Many Possibilities for Cutting Costs and Improving Products**



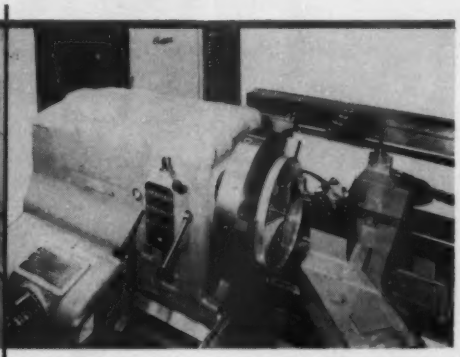
**Sheet Steel Slitter...** Century Selective Speed Finger-Tip control provides a wide range of speeds, including start, stop and threading speed to maintain high tonnage rate.



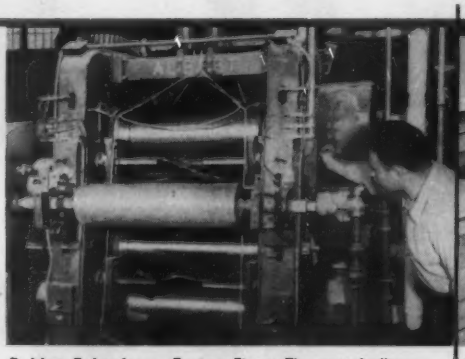
**180" Metal Spinning Lathe...** Performance-Rated speed control allows the operation to be accurately integrated ... the speed matching the function of shaping.



**Plaster Board Processing...** As thousand-foot sections of plaster board are hardened, speed of each conveyor section is automatically regulated according to the conditon of the material.



**Metal-Working "T" Lathe...** Correct and uniform cutting speed is maintained in this facing operation. Century Selective Speed Drive automatically increases and decreases speed as cycle moves from edge to center and back.



**Rubber Calender...** Century Finger-Tip control allows the processing speed to be constantly regulated in the production of various sizes of rubber thread for the textile industry.

**Double-Face Corrugating Machine...** A production increase of 250% was made possible by the Century Selective Speed Drive on this machine. Speed is accurately controlled for corrugating, gluing, drying, curing, scoring, slitting, and cutting.

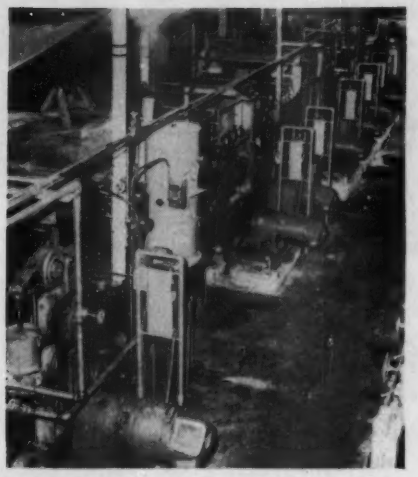
Performance-Rated© Century C MOTORS

**CENTURY ELECTRIC COMPANY**

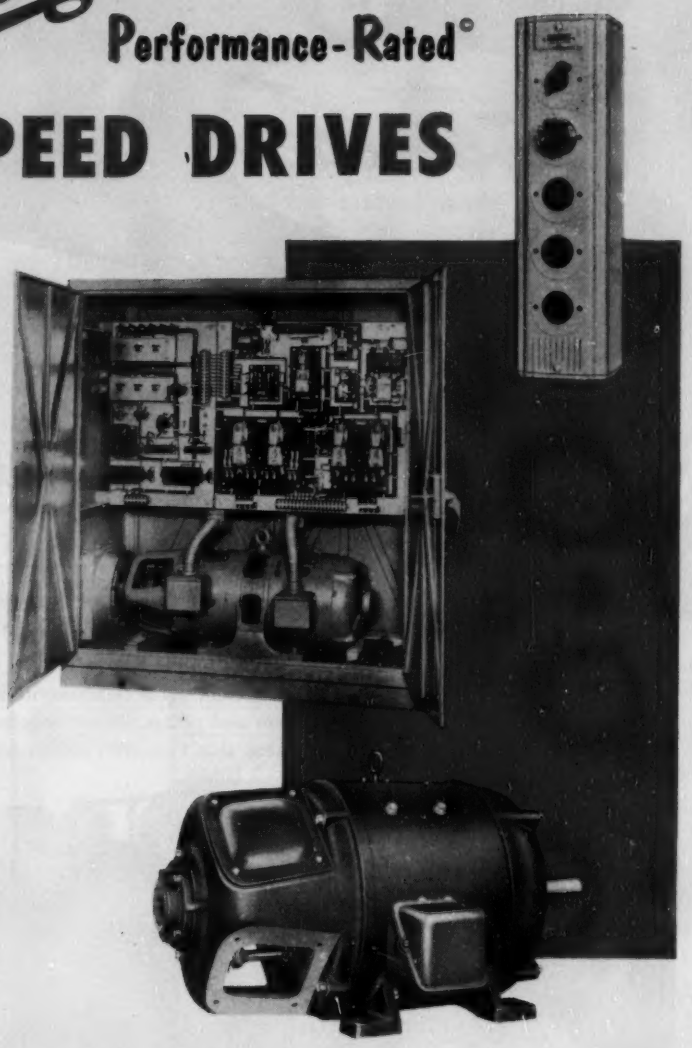
1806 PINE STREET ST. LOUIS 3, MISSOURI

1/8 TO 400 H.P.

# with Century Performance-Rated®
# SELECTIVE SPEED DRIVES



**Textile Pad Dye Steam Range...** With a central Century Selective Speed Drive, the several motors on this related sequence operation are accurately controlled.



From 1 to 150 horsepower for operation on A.C.... Wide range of speed with exact control under varying load conditions... Start fast or slow... Forward or reverse... Furnished with or without dynamic braking... Wide variety of remote controls available.

**Overhead Conveyor...** In this automotive engine test operation, extremely accurate speed control is necessary... and it is provided by a Century Selective Speed Drive.

831

**Mail this coupon**—find out how Century Performance-Rated Motors and Selective Speed Drives can help you.

**TO Century Electric Co., 1806 Pine Street, St. Louis 3, Mo.**

Send me information about CENTURY SELECTIVE SPEED DRIVES.

*For Driving*.....

*Name*..... *Title*.....

*Company*.....

*Address*.....

*City*..... *Zone*..... *State*.....

another
**Columbia**
shear feature

**front operated back gauge**

. . . allows quick, accurate adjustment of back gauge from front of shear to 1/128ths inches, with setting indicated on dial assembly calibrated in 1/64ths.

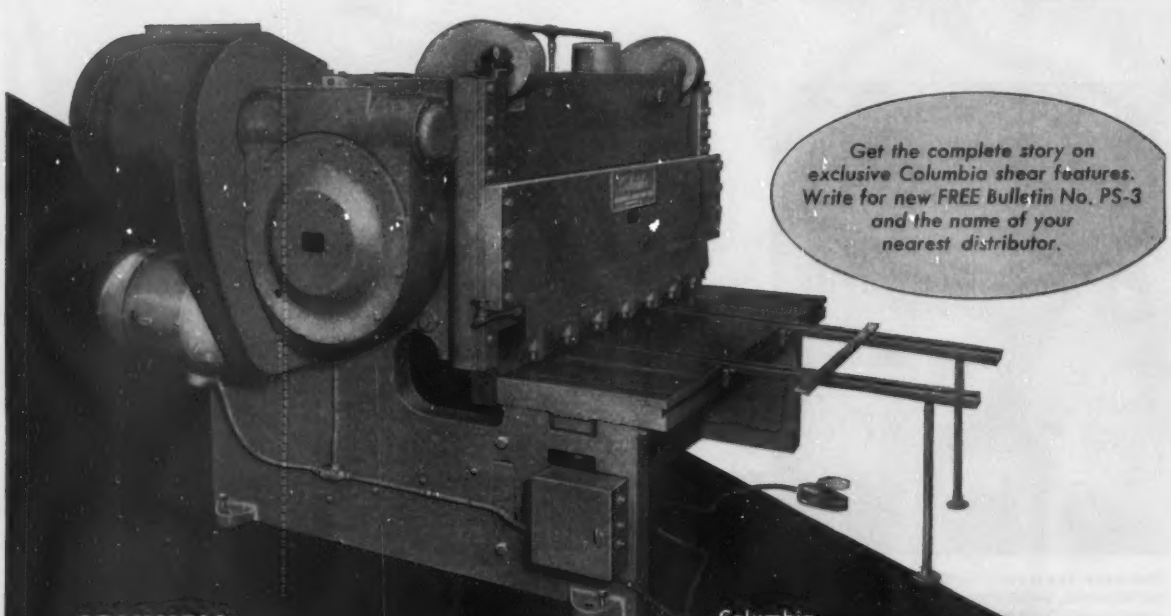
# accurate back gauge settings at your fingertips

Many time and step-saving features make the Columbia "New Series" power squaring shears the leaders in industry for fast, truly convenient operation.

For example, with the Front Operated Back Gauge, a simple twist of the dial adjusts the gauge to 1/128ths inches. On the shear shown below, actually 4608 precise settings are at the operator's fingertips in front of the shear. A special motorized arrangement can also be included at extra cost.

All shears in 3/16", 1/4" and 3/8" capacities have a 24" back gauge range, while 1/2" models have a 36" range. A special swing-up type back gauge can be furnished as an extra with 36" range gauges for cutting metal beyond that range without removing the angle.

Other Columbia features you should know about include the exclusive air clutch, blade clearance indicator, hydraulic hold-downs, jog control for ram and others. These, together with rigidity and long-lasting accuracy, mean that Columbia Shears offer more machine for the money.



*Get the complete story on exclusive Columbia shear features. Write for new FREE Bulletin No. PS-3 and the name of your nearest distributor.*

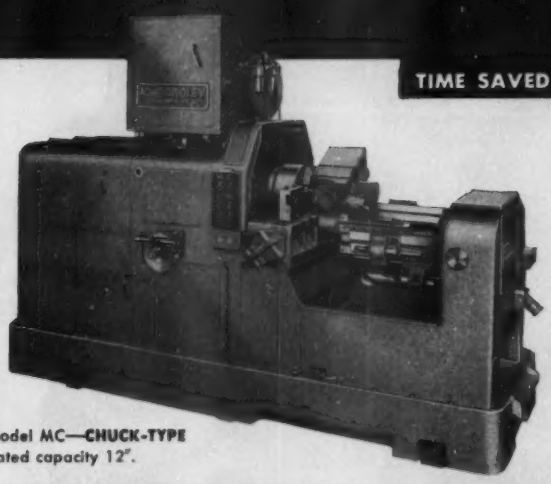
Columbia
Power Squaring Shear,
Model 0806. Capacity ½" x 6'

COLUMBIA
DIVISION
THE **Lodge & Shipley** COMPANY
HAMILTON OHIO

# CAN YOU TURN NON-PRODUCTIVE TIME INTO SAVINGS LIKE THESE?

On each of the examples shown here, most of the savings resulted from reducing the time between cuts. Almost all modern machines can make chips as fast as present day cutting tools can "take it," but only Automatically Controlled Cycle* gives you an opportunity to save where it counts most — by reducing non-productive time required to withdraw the tool, index the turret and advance the tool to the work. Acme-Gridley Fully Automatic Turret Lathes do this job at accelerated speeds — with minimum waste of time and manpower

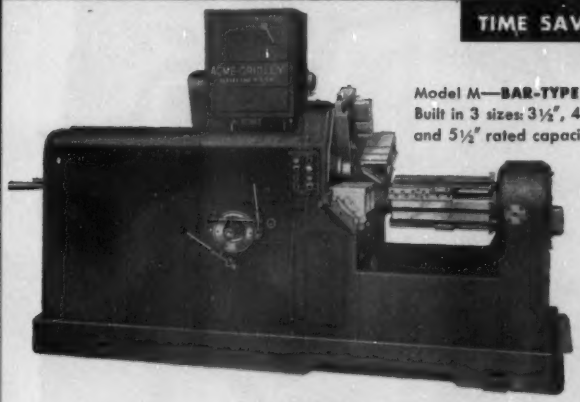
## TIME SAVED on Acme-Gridley Fully Automatic Chuck-Type Turret Lathe



Model MC—**CHUCK-TYPE**
Rated capacity 12".

| Part Name | Finger Holder Body | Master Collet Blank |
|---|---|---|
| Material | 6⅝" dia. Semi-Steel | 6" dia. 4160 Steel (Solid Slug) |
| Former Time | 39.2 minutes | 98 minutes |
| "MC" Time | 11.2 minutes | 35.4 minutes |
| | **Savings 28 Min.** | **Savings 62.6 Min.** |

## TIME SAVED on Acme-Gridley Fully Automatic Bar-Type Turret Lathe



Model M—**BAR-TYPE**
Built in 3 sizes: 3½", 4¾" and 5½" rated capacities

| Part Name | Sleeve—4x3¼" long | Whirl—3½x4⅝" long |
|---|---|---|
| Material | 1112 Steel | Leaded Open Hearth Steel |
| Former Time | 30 minutes | 21 minutes |
| "M" Time | 6 minutes | 5.7 minutes |
| | **Savings 24 Min.** | **Savings 15.3 Min.** |

### Here's what AUTOMATICALLY CONTROLLED CYCLE* means to you

- The complete machining cycle is faster because all non-productive movements are performed automatically — and at *accelerated* speeds.
- Cuts are made (with either high-speed or carbide tooling) as fast as present day cutting tools can take it.
- Producing rate is thus predetermined and remains the same at the end of the shift as at the start.
- Machining is done at the surface speed best suited for required finish and tolerance because each toolslide is independently cammed and selective spindle speeds are automatically controlled.

**Standard on all Acme-Gridleys*

## The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.

# NO down

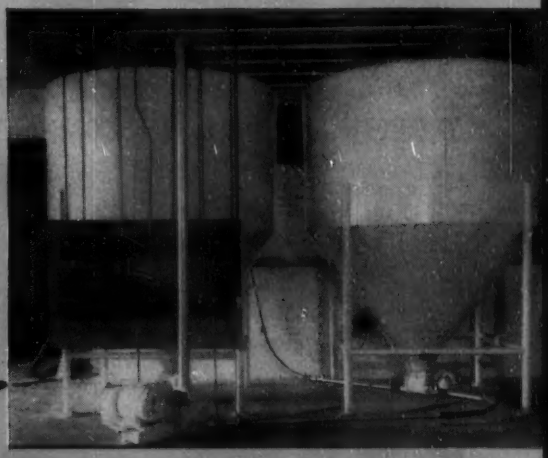
*Photos courtesy Century Machine Company, 4434 Marburg Avenue, Cincinnati 9, Ohio*

# time in 16 years...

The records of the Century Machine Company show "no down time in sixteen years use" on this Cincinnati Press Brake.

This machine, working a 9½ hour day, forms light gauge sheets in mild and stainless steel up to ¼" thickness. It is constantly producing accurate parts for easy assembly of Century's baking ovens and bakery machinery.

Write for free Vinyl Plastic Tonnage chart TC-1 on your company's stationery.



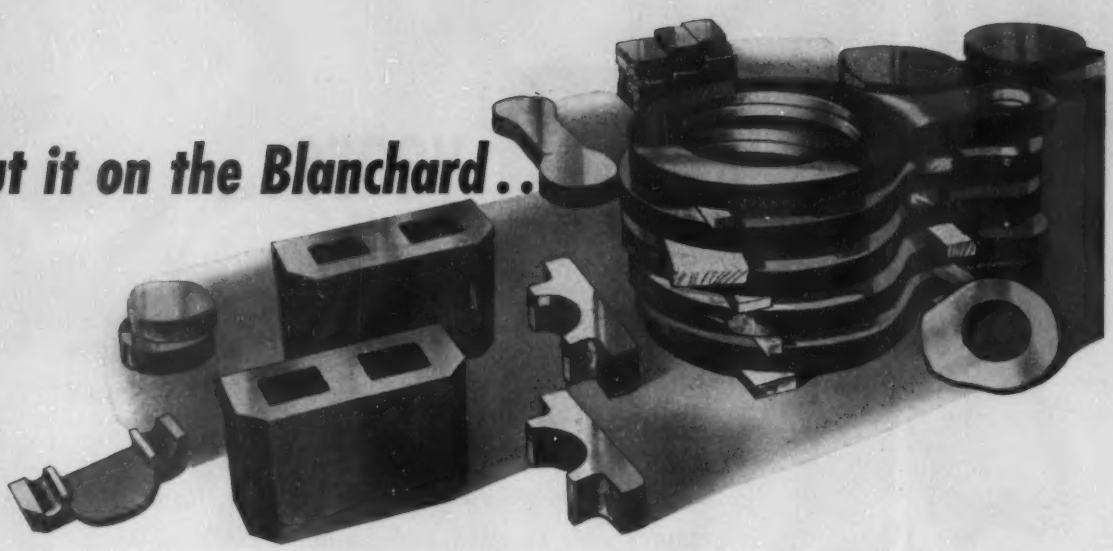
● Flour Storage Bins—each 1000 lbs. capacity

## THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI

# Put it on the Blanchard..



***it's versatile!*** Large and small shops alike find this Blanchard, with 72" diameter magnetic chuck, ideal for fast, precision grinding of miscellaneous work.

***it holds*** multiple small pieces or plates, castings and die blocks up to 80" across corners, directly on the magnetic chuck. Irregularly-shaped workpieces are easily held with simple fixtures. (Custom-built grinders of this type can handle work 30" high.)

***it's fast***—with a hard wheel, soft steel can be "hogged off" at a rate of 10 cubic inches per minute.

***it's precise***—with a soft wheel, hardened steel ways are regularly ground flat and parallel to .001", with surface finish of 5 micro inches!

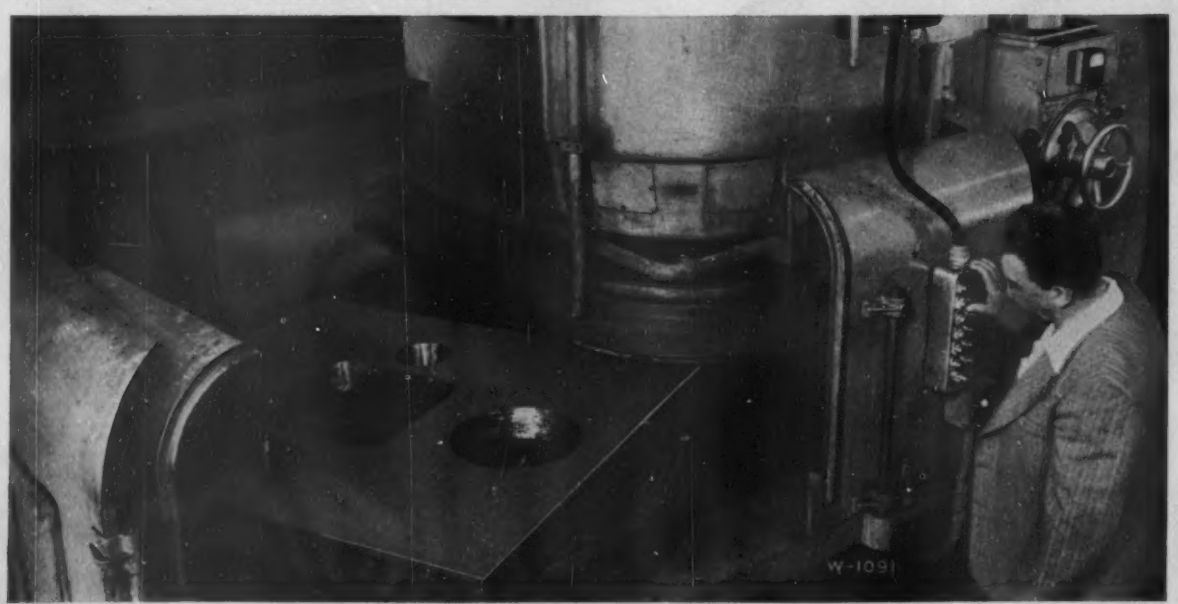
No wonder shopmen say this Blanchard No. 42-72 is "tops for versatility"!

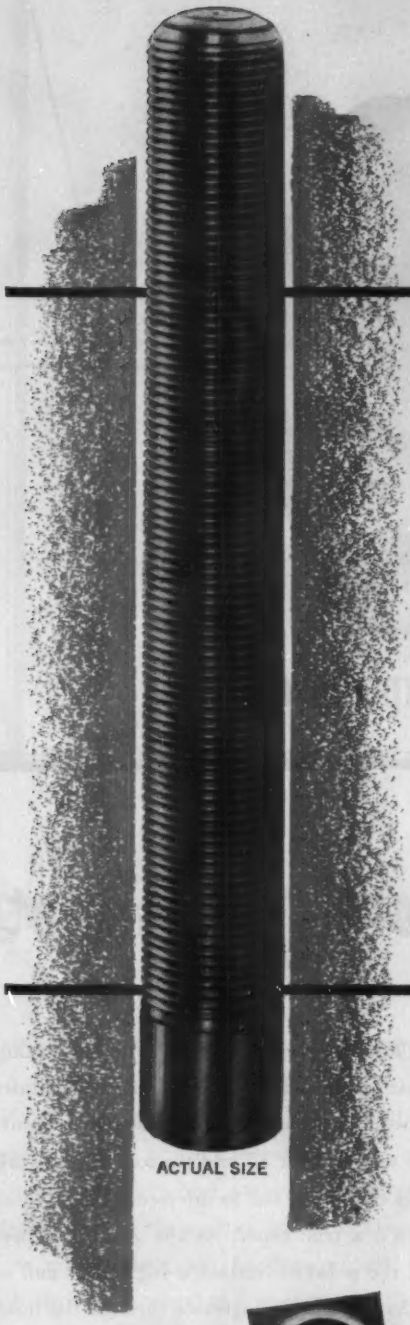
*Send for free copies of "Work Done on the Blanchard" (fourth edition), and "The Art of Blanchard Surface Grinding".*

**PUT IT ON THE BLANCHARD**

**THE BLANCHARD MACHINE COMPANY**

**64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**





ACTUAL SIZE

# when the odds don't have it...

Before putting the chips down it is well to realize that reliable machine performance is largely dependent on well balanced tooling. If it is a multiple spindle bar automatic, an even number of work spindles provides a better opportunity for balance than an odd number.

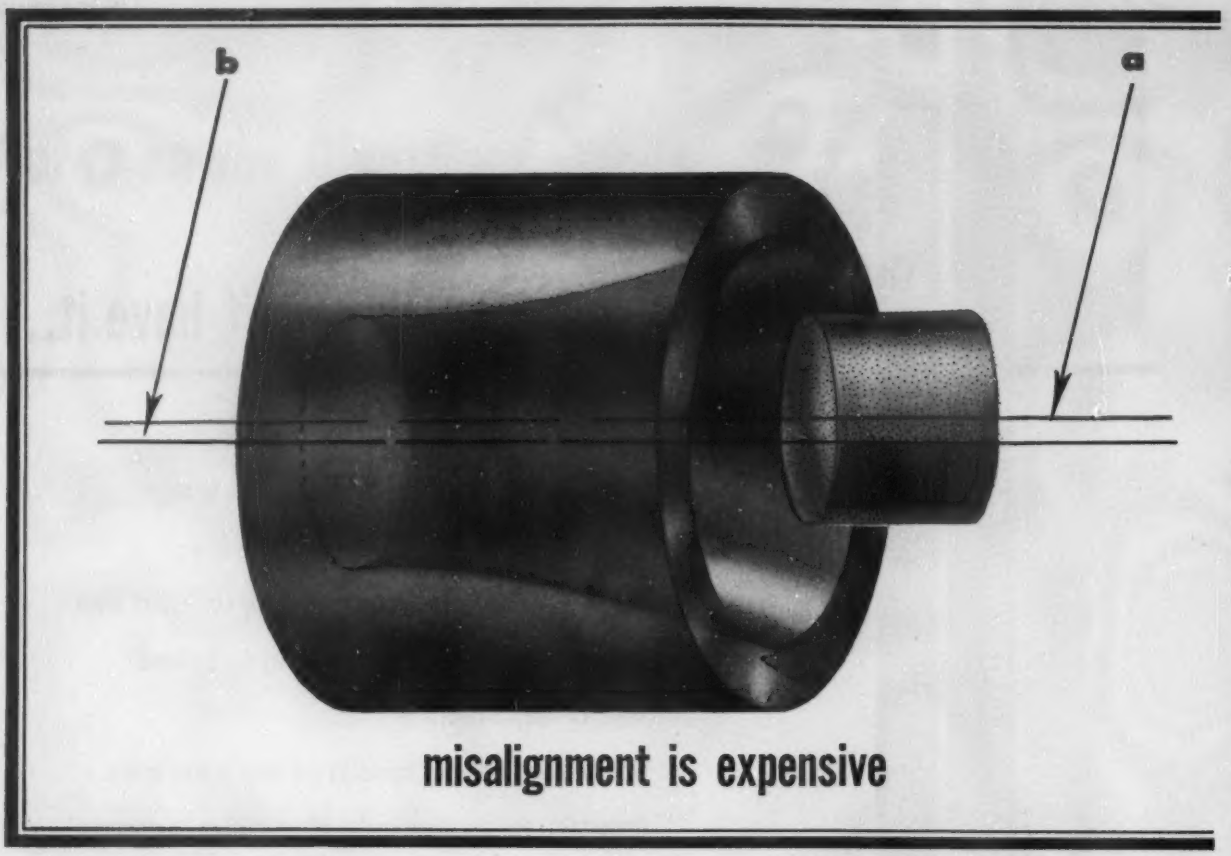
Odd or even, the work spindles are only one of many important considerations in the selection of an "automatic". Other factors also important to the individual machine user are suggested by the new Conomatic General Datalog. Copies are now available.

data for comparison

| | |
|---|---|
| **Part** | **Levelling Screw** |
| **Machine** | **1⅛" Six Conomatic** |
| **Tools** | **100% Carbide Tipped** |
| **Material** | **B-1112** |
| **Stock Size** | **1" Round** |
| **R. P. M.** | **Work Spindle — 958**<br>**Opposed Spindle — 677** |
| **Time** | **7.25 Seconds per Cycle**<br>**3.6 Seconds per Piece** |

**Conomatic**

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.




misalignment is expensive

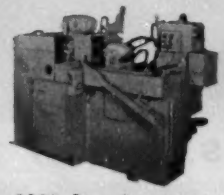
# ...Bryant controlled alignment

To grind a taper, the internal grinder must be set up according to simple geometric principles; that is, the path of the grinding wheel must be a straight line and must intersect the axis of the workpiece at a point. In the illustration, the axis of the wheel path "a" and the axis of the work "b" lie in parallel planes. The axes cross, but fail to intersect. Under these conditions, it is impossible to grind a true taper. As the grinding wheel enters the large end of the taper, the point of contact is high. This end of the taper can be ground to size. As the wheel progresses through the hole, the contact moves even higher, with the result that the hole will be pro-

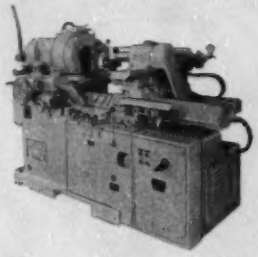
*Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie—free showings arranged for engineering groups.*

no. 1109 9" swing, semi-automatic

no. 1309-W 9" swing, 2 spindle semi-automatic

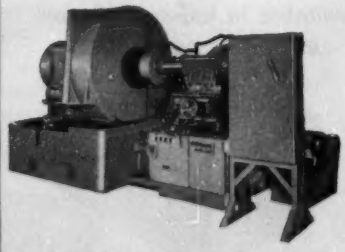


no. 2209 9" swing, automatic



no. 1116 16" swing, semi-automatic

no. 1416 16" swing, semi-automatic, for long work



no. 1460 60" swing, semi-automatic

The Bryant 1416 Internal Grinder is a semi-automatic machine for grinding bores in long parts and is adaptable for either production or tool room work. It will swing work up to 16" and grind bores up to 9" depth. The work is held in a standard hollow work spindle and steadyrest. The workhead may be adjusted longitudinally over a distance of 37" to meet the requirements of a large variety of work. It may be pivoted for grinding a taper up to 30° included angle. Hydraulic operation provides a wide range of traverse speeds. The rear of the wheelslide can be adjusted to insure straight line motion of the wheel. Write for folder.

# gives better internal grinding

gressively oversize and a curve is generated instead of a uniform taper.

A taper ground under these conditions probably will blue only in the middle. Turning the workhead may shift this plug contact but, as the wheel wears, the plug contact will continue to move. The remedy is to correct alignment so the wheel path and wheel axis "a" and the work axis "b" intersect and lie in a plane which includes the diamond. Then a uniform taper will be generated. In shop practice the adjustment would be made by bringing the wheel and work to exactly the same center height.

see our catalog in MACHINE TOOL CATALOGS or write for copy

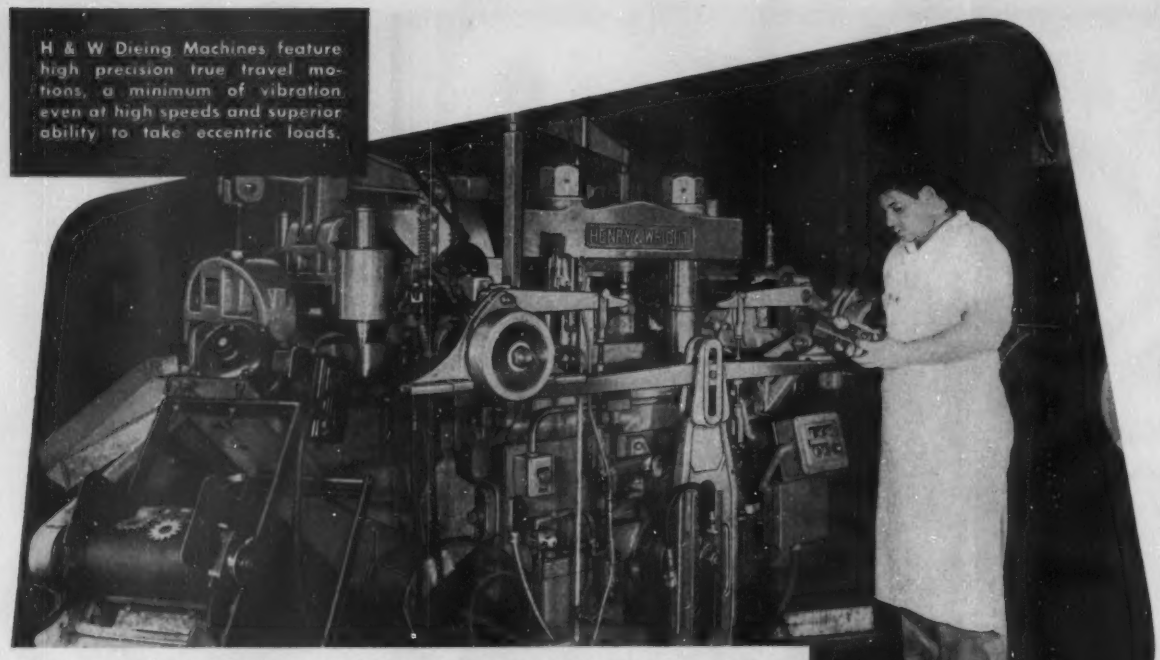
## Bryant Chucking Grinder Co.

Springfield, Vermont, U. S. A.

Offices: Indianapolis · Cleveland · Chicago · Detroit · Mt. Vernon, N.Y. · Philadelphia

*Internal Grinders • Boring Machines • Internal & External Thread Gages • Granite Surface Plates*

H & W Dieing Machines feature high precision true travel motions, a minimum of vibration even at high speeds and superior ability to take eccentric loads.




**RUNS FROM 1 TO 1,000,000 PIECES**

Parts like these, and three changeovers per day, too!

# and nothing is made for stock

Production runs are from 1 to 1,000,000 pieces. Alloys, stock sizes, toolings differ for nearly every run. Yet Henry & Wright Dieing Machines in the plant of Wallace Barnes Company, Bristol, Conn., take care of this with nary a need to carry any of the production in stock.

Tooling changeovers are quick. Hence, deliveries are quick.

Precision is high. Hence, spoiled work scrap is low.

Some of the alloys are tough, others are highly workable. Some of the shapes are intricate, others are simple. None of the dies are "special for these machines"; all will fit any presses of sufficient tonnage in the shop.

Two, and even three, die changes are made per shift with no trouble at all. Henry & Wright Dieing Machines displaced five "conventional" ones.

Could your shop use a production method that is as simple, certain and smooth as this one? Would you like machines that can eliminate shelf inventory as a necessity for quick deliveries?

There is a lot more to the story. Please let us tell you all about it. Write to Henry & Wright, Division of Emhart Mfg. Co., 481 Windsor St., Hartford, Conn.

***H & W Dieing Machines are available in capacities from 25-ton to 2500-ton.***

**HENRY & WRIGHT**

Division of Emhart Mfg. Co.

**HARTFORD, CONNECTICUT**

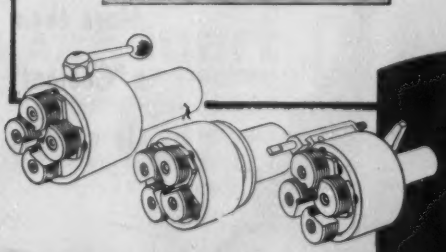
another example—

# knurled...

*78% faster*

WITH CIRCULAR CUTTERS

WITH BLADE CUTTERS



## WITH VERS-O-TOOL

When Whitin Machine Works, Whitinsville, Mass., applied their 1⅝" standard Vers-o-tool to one-pass knurling this textile machine part (7" long, B-1113 steel), they stepped up former production from 72 to 128 pieces per hour.

They get a higher quality too, because the 4-cutter Vers-o-tool head opens instantly at the end of the cut and pulls back fast without contact to damage the sharp knurl. Thousands of different jobs are run every day with standard Vers-o-tools equipped with multiple chasers or cutters such as those shown at the left.

Most of these simple, rugged heads are used for threading, equipped with the long lived Ground Thread Circular Chasers—most economical for long runs—or with the lower-cost Adjustable Blade Ground Thread Chasers for smaller lots. All guarantee Class 3 or pressure-tight quality threads—and smoother.

Conversion from Circular Chaser threading to any other type multiple cutters is simple: you change only the cutters and blocks—all types of which are interchangeable, head size for head size, for revolving or non-revolving heads. Vers-o-tool capacities range from .056" to 6½".

Ask us to show you how standard VERS-O-TOOLS can step up your OUTPUT, guarantee ACCURACY, reduce your TOOL INVESTMENT and your OPERATING COST. Ask for catalog DT-52.

**24-hour deliveries on standard stockable NC and NF chasers and blocks. Also National Taper Pipe and Dry Seal.**

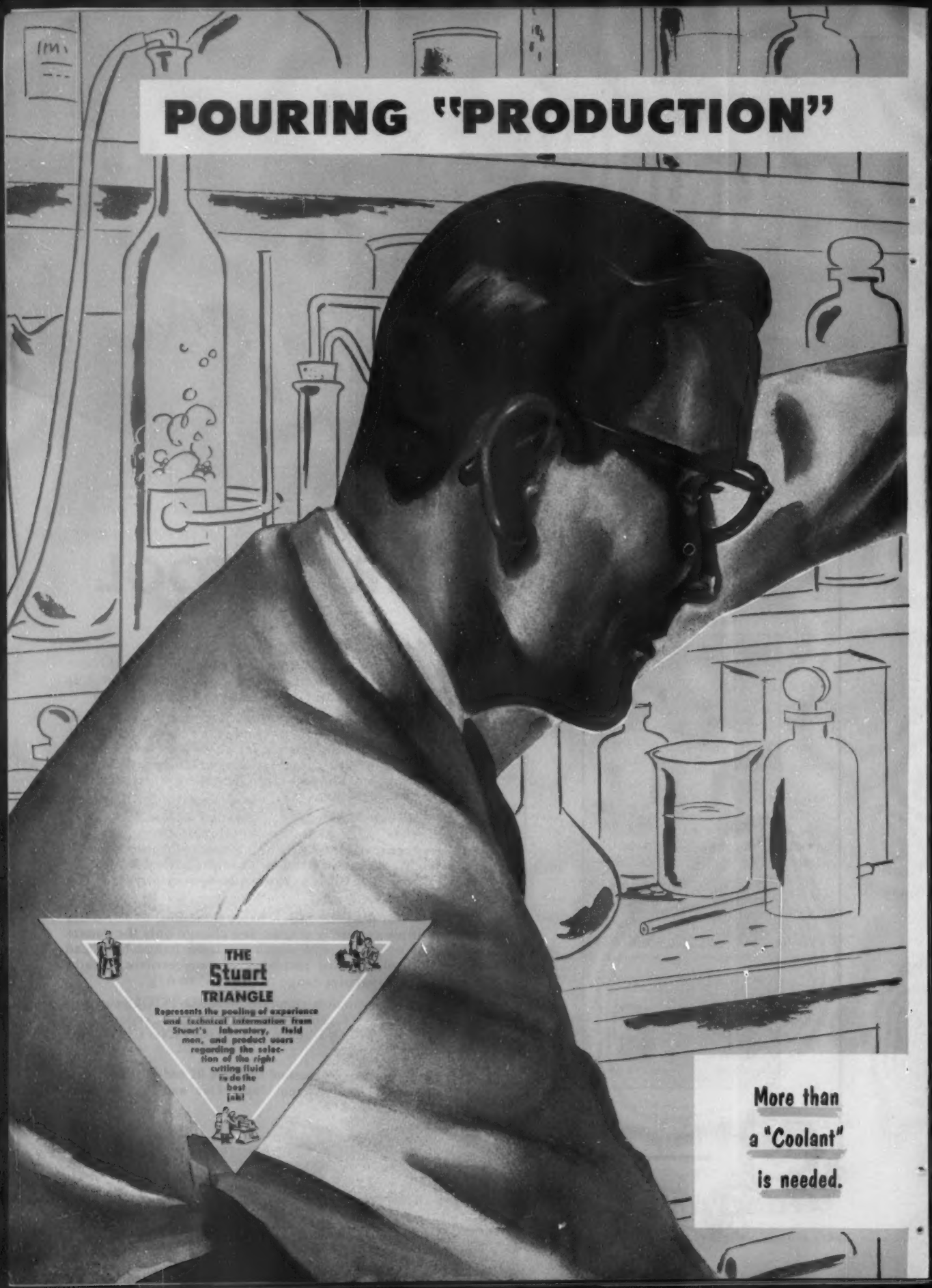
The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS

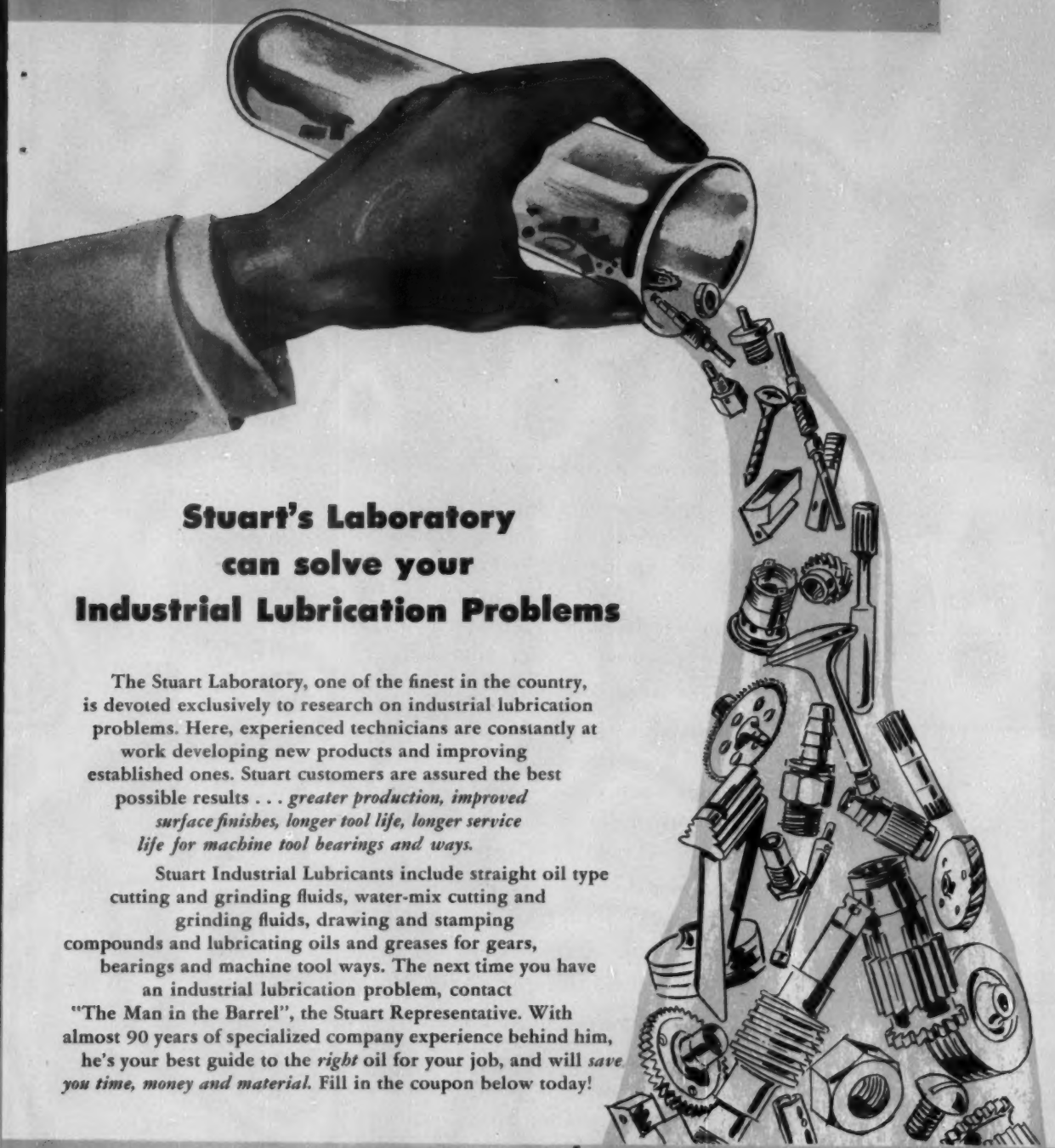
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.

# POURING "PRODUCTION"


THE
Stuart
TRIANGLE
Represents the pooling of experience and technical information from Stuart's laboratory, field men, and product users regarding the selection of the right cutting fluid to do the best job!

**More than a "Coolant" is needed.**

# OUT OF TEST TUBES



## Stuart's Laboratory can solve your Industrial Lubrication Problems

The Stuart Laboratory, one of the finest in the country, is devoted exclusively to research on industrial lubrication problems. Here, experienced technicians are constantly at work developing new products and improving established ones. Stuart customers are assured the best possible results . . . *greater production, improved surface finishes, longer tool life, longer service life for machine tool bearings and ways.*

Stuart Industrial Lubricants include straight oil type cutting and grinding fluids, water-mix cutting and grinding fluids, drawing and stamping compounds and lubricating oils and greases for gears, bearings and machine tool ways. The next time you have an industrial lubrication problem, contact "The Man in the Barrel", the Stuart Representative. With almost 90 years of specialized company experience behind him, he's your best guide to the *right* oil for your job, and will *save you time, money and material.* Fill in the coupon below today!

**D. A. Stuart Oil Co.**
EST. 1865 LIMITED

*TIME-TESTED CUTTING FLUIDS AND LUBRICANTS*

2729 S. Troy St., Chicago 23, Illinois
*In Canada:* Canadian D. A. Stuart Oil Co., Ltd.
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CLIP TO YOUR COMPANY LETTERHEAD AND MAIL TO

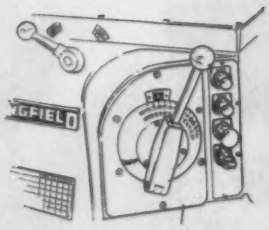
D. A. Stuart Oil Company
2729 S. Troy Street, Chicago 23, Illinois

☐ Please have Stuart Representative call.

☐ Please send a copy of the booklet titled Stuart's Water-Mix Cutting & Grinding Fluids.

Name .....

Title .....



*it does more work (and the operator does less)*

Simple, least-effort controls: color-coded dial selection of 24 spindle speeds; four levers for totally enclosed gear box; tailstock wheel set at angle for easiest operation; wheel has two speeds, one for normal operation, one for drilling; chip pan on casters for quick movement to insure cleaner, safer floors.

*it runs cooler*

Continuous oil-mist lubrication of all headstock gears does more than lubricate; it carries heat away into large sump in headstock leg. Cooler head minimizes distortion during warmup; markedly improves accuracy and stability of work alignment.

*it saves power, cuts wear*

The headstock has only four gears in mesh at once for any speed. Other gears run free; flywheel action adds to stability. No "pass-through" gears in shifting.

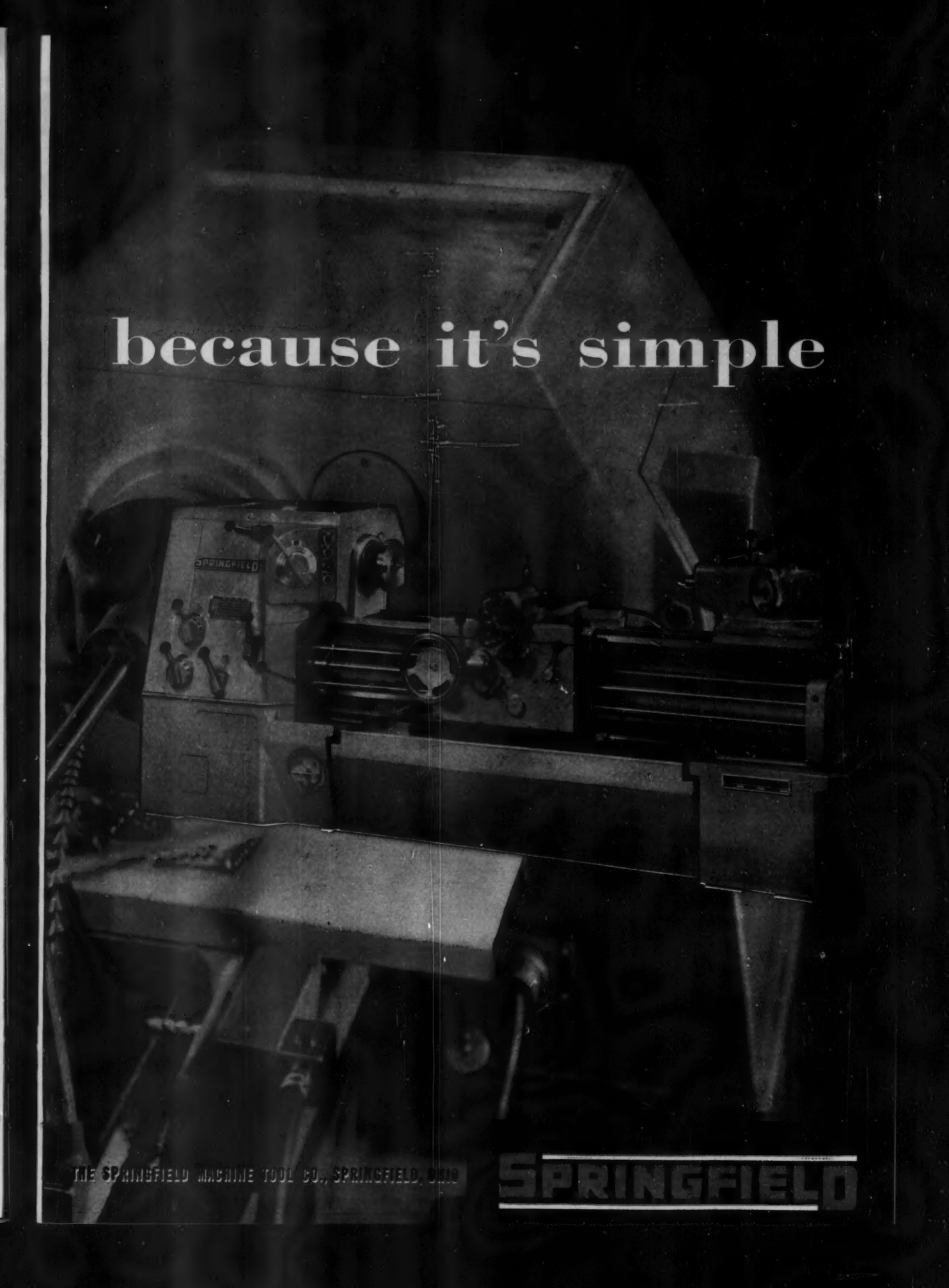
*it promotes cleanliness—and safety*

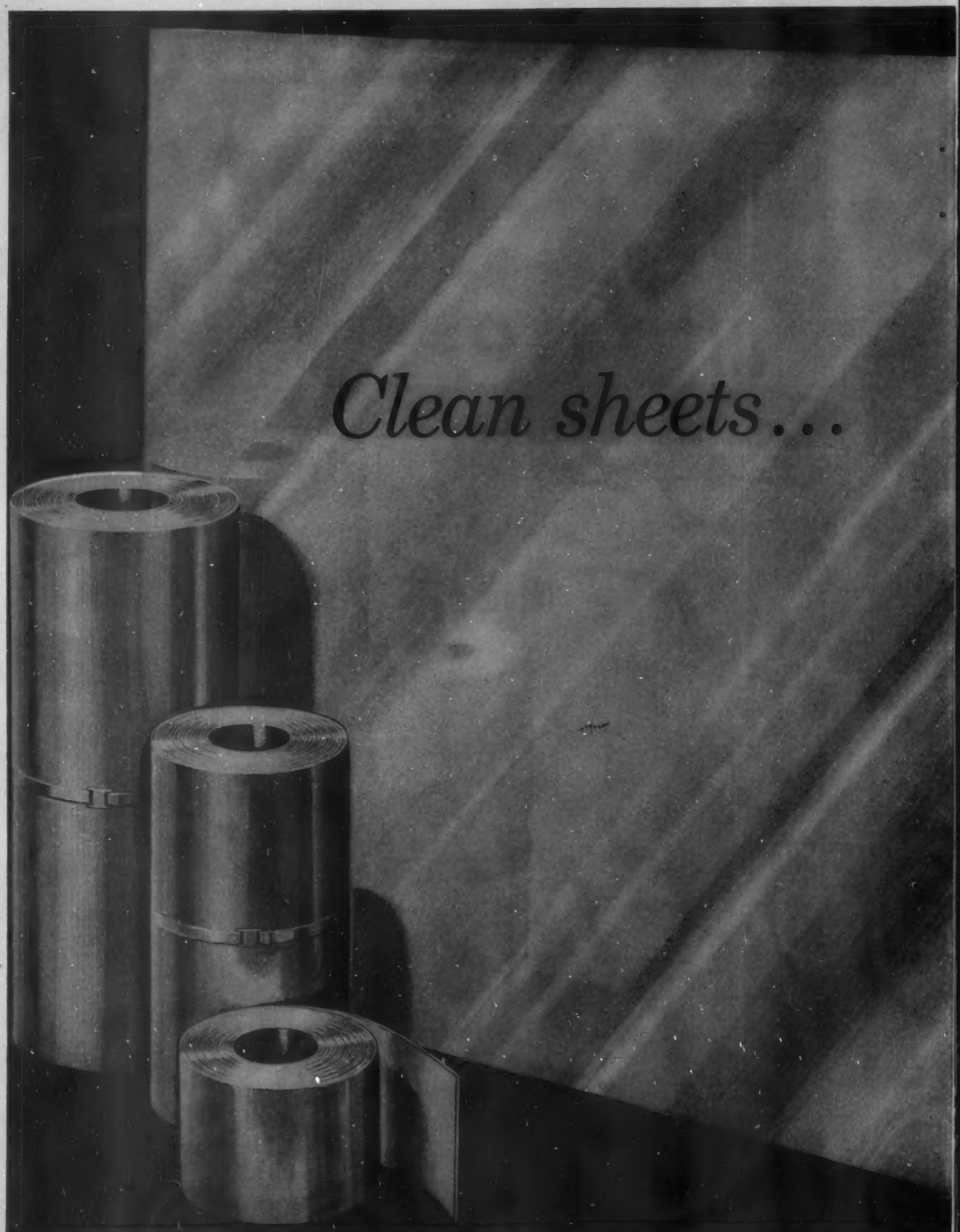
Clean modern design encourages good shop practices, better maintenance; builds pride in workmanship and better quality in work produced.

Engine and toolroom lathes: swings 14" to 32"
Contouring and reproducing lathes: swings 14" to 32"
Universal vertical grinders: swings 21" to 32"

*write for name of your nearest dealer*

67TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS


because it's simple
SPRINGFIELD
THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO
SPRINGFIELD


Clean sheets...

# *make better products*

*Clean* is the word for Chase Brass Sheet and Strip—it's always bright...smooth...free from oxide coating and excess oils. It's always straight and smooth on the edges, too—and uniform in width, gauge, temper. For *you*, that means *higher* product quality...*lower* finishing costs. The fact is, Chase® sheet metal saves you money all along the line. Its high ductility and malleability make for easier, faster forming, longer tool life. It's *so* workable, it often allows you to combine forming processes without intermediate annealing steps.

**Chase**

**BRASS & COPPER CO.**

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

For the *finest* in sheet brass, bronze or copper—get in touch with your Chase wholesaler or the nearest Chase warehouse. And remember—Chase now sells stainless steel, too!

NEW PRIZE-WINNING MOVIE—"*The Science of Making Brass.*" Available for free showing in your plant or office, or to industry groups. Call nearest Chase warehouse or write us.

*The Nation's Headquarters for Brass & Copper*

| | | | | | | |
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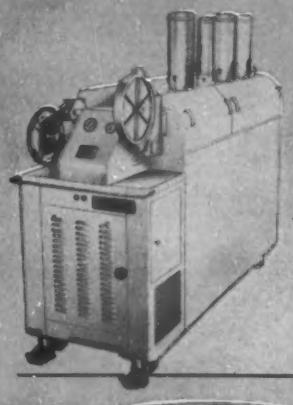
# 18% PRODUCTION INCREASE

## Maintenance Practically Eliminated

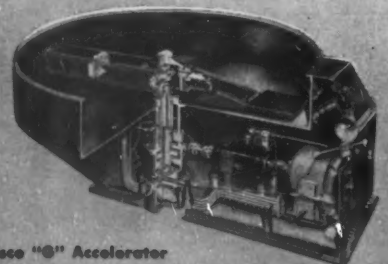
Winding TV power transformer coils at Sparton Radio-Television

¾ H.P.

SERIES TR3



**Motion Picture Film Processing Machine By Houston Fearless Corp.**—Another application where stepless variable speed and constant torque of Vickers Hydraulic Power Transmission provided much more satisfactory operation.



**Geniaco "G" Accelerator**
A rugged, low cost unit used to calibrate accelerometers and other equipment under operational acceleration forces. Speed settings must be accurate and precisely maintained over extended operating periods. Driven by Vickers Variable Speed Hydraulic Transmission.

# VICKERS.

## VARIABLE SPEED

# Hydraulic Transmission

Hourly production was increased 18% when these coil-winding machines at Sparton Radio-Television were equipped with the Series TR3 Vickers Variable Speed Hydraulic Transmission. This improvement resulted from the superior control features inherent in the transmission: (1) extremely quick and smooth variations in speed, (2) maximum torque at low rpm, (3) instantaneous starting and stopping.

While the previous drives required maintenance approximately once a week, the Vickers transmissions have needed attention only three or four times since they were installed four years ago. They have built-in automatic overload protection and they are automatically pressure lubricated by the power-transmitting medium (oil).

Perhaps you have an application where this Vickers Variable Speed Hydraulic Transmission will make similar improvements and economies. Ask the nearest office listed below for Bulletin 47-40a.

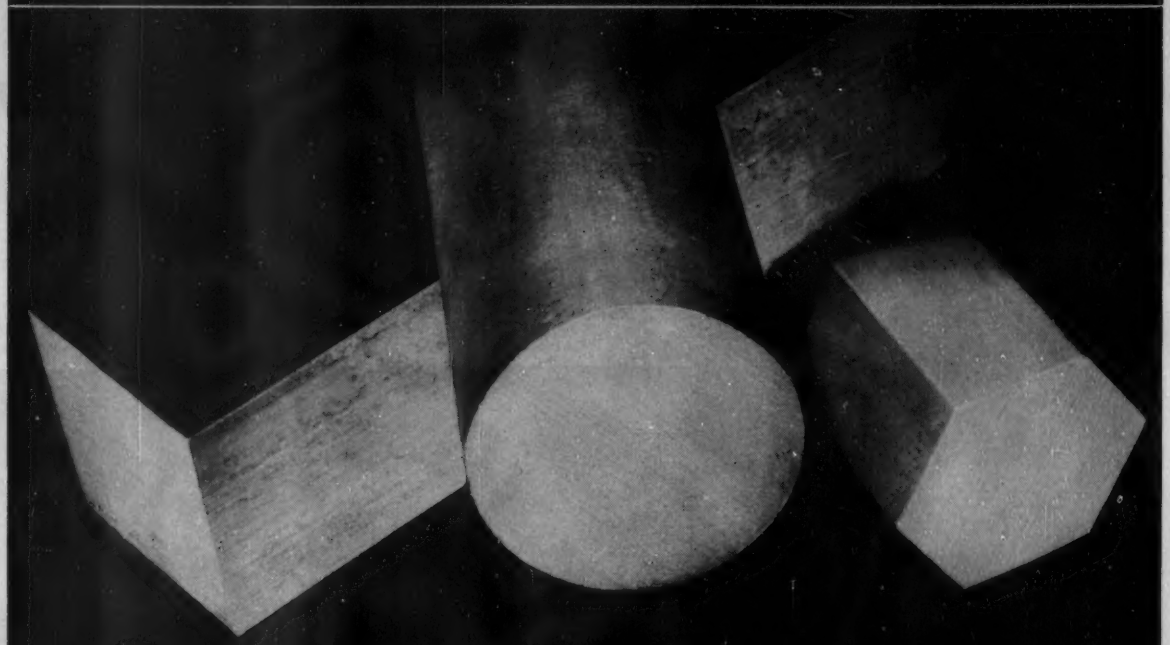
**VICKERS Incorporated**
*DIVISION OF THE SPERRY CORPORATION*
**1410 OAKMAN BLVD. • DETROIT 32, MICH.**

***Application Engineering Offices:*** **ATLANTA • CHICAGO (Metropolitan) CINCINNATI • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES (Metropolitan) • NEW YORK (Metropolitan) • PHILADELPHIA (Metropolitan) PITTSBURGH • ROCHESTER • ROCKFORD • SEATTLE • TULSA WASHINGTON • WORCESTER**

6486

*ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921*

# WHY IT PAYS TO BUY STAINLESS BARS FROM US



You get the widest selection
of types, grades, sizes

## TRIPLE SECURITY

**What you want**
**When you want it**
**At the right price**

• You can greatly simplify your buying of stainless steel bars by calling the nearest U. S. Steel Supply warehouse. Our warehouses offer the widest selection of top quality bars ready for immediate delivery. These bars are made from USS Stainless Steel—produced under the strictest quality control from ore to finished product—so you're sure of getting the exact grade you specify.

In addition our large stocks provide greater design freedom for your particular needs. And our experienced stainless men are at your disposal to help you select the best grade for the job . . . and even to help you with design problems.

Call us for USS Stainless bars—rounds, squares, hexagons, angles, channels—and for stainless sheet and strip, too.

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UNITED STATES STEEL

SEND COUPON FOR FREE LITERATURE

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Gentlemen:
Please send me, without obligation, your literature containing complete information on your stainless steel stocks and service.

Name.....
Company.....
Address.....
City.....State.....

"see how fast you can set up multiple tools and an automatic cycle for

# Small Lot Turning!"

"Watch Me Set-up This Sundstrand Automatic Lathe in 30 Minutes"*

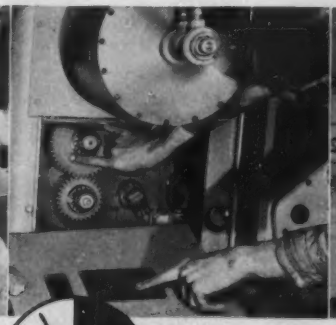
*(Time is for an average job using 4 front tools for turning and 3 rear tools for facing.)

Placing master sample in machine.

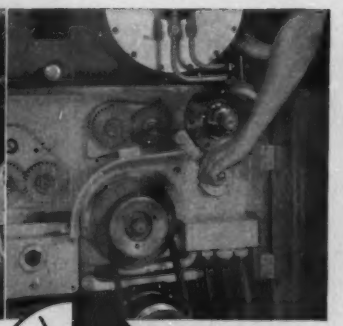
Setting control dogs.



Positioning rear tool blocks.



Selecting correct feeds and speeds.



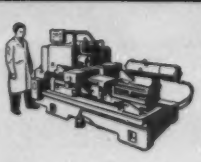
Running through cycle by hand crank.

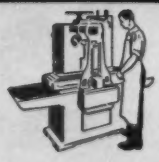
AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS

SUNDSTRAND

"Engineered Production" Service*

*REG. U.S. PAT. OFF.

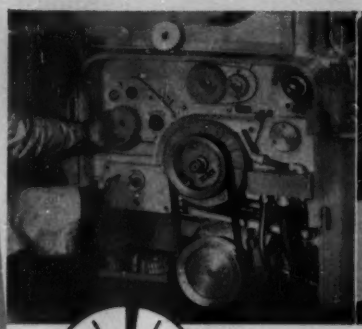




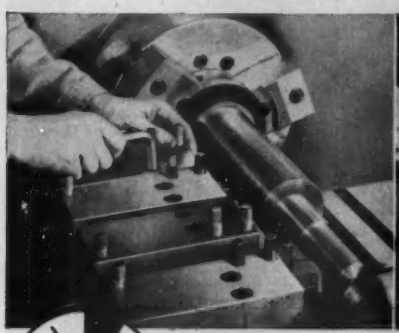
"They clocked me twice in setting up this particular job... checked and double checked my time... then added 10 minutes — I actually did it in 20, but they figured, being a demonstrator, I would have a little edge on speed. But, as you can see, it's relatively simple to do it in 30 minutes. You, or your machine operator could do it in this time without much practice.

"Here are the most important steps in making a set-up for a 7-tool job."

**Here's how it's done...**

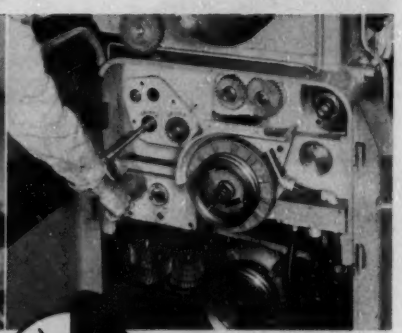


Disconnecting rear tool slide and removing tool relief blocks.

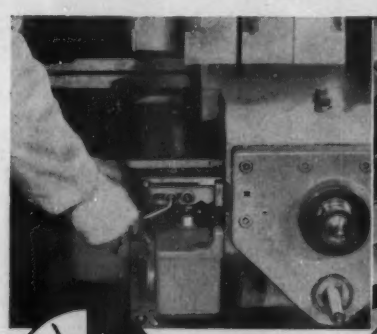


Positioning front tools around master sample.

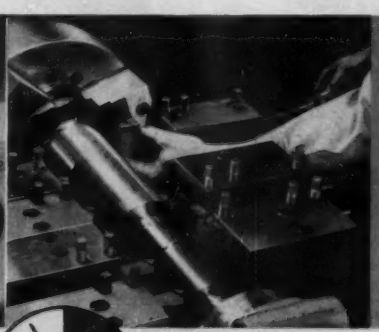
Set front carriage dwell.



Adjusting rear slide to front dwell position.



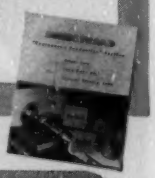
Setting tool relief blocks.



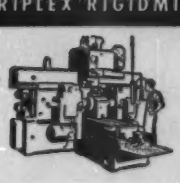
Final adjustment of tools.

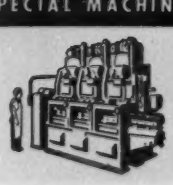
**"Here's how this and other time-saving features can reduce your turning time."**

A more detailed description of procedure in setting up Sundstrand Automatic Lathes is given in this new booklet. Also described are on-the-job installations complete with tooling diagrams and illustrations. Write for your copy today. Ask for bulletin 149.



TRIPLEX RIGIDMILS | SPECIAL MACHINES





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**Machine Tool Co.**
**2533 Eleventh St. • Rockford, Ill., U.S.A.**

BAY STATE
SAF-T-CUT
BZ
"BZ"
Disc-Wheel

# "real POWER" grinding!

Fibreglass Reinforcement
Specially treated Nylon Mesh
Layers of Fast Cutting Abrasive
Fibreglass to support area around hole and hub

Again BAY STATE progress opens new horizons in faster, safer heavy-duty portable grinding. Saf-T-Cut "BZ" disc-wheels are reinforced with multi-layer fibreglass and specially treated nylon.

Give "BZ" disc-wheels all the power you have! Run them at maximum recommended speeds! They have been "built" to withstand heavy-duty grinding . . . with long wheel life. Extensive tests on weld grinding jobs have produced record breaking results.

Get the fastest heavy-duty cutting action, the greatest disc-wheel strength, the maximum wheel life . . . *plus* a range of hardnesses from which to choose the one you need. Saf-T-Cut "BZ" is Bay State's *latest* "Wheel of Progress"!

BAY STATE ®
WHEELS of PROGRESS

**ASK FOR A DEMONSTRATION ON YOUR WORK.**

*Manufacturers of all types of Quality Abrasive Products*

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Distributors — All principal cities
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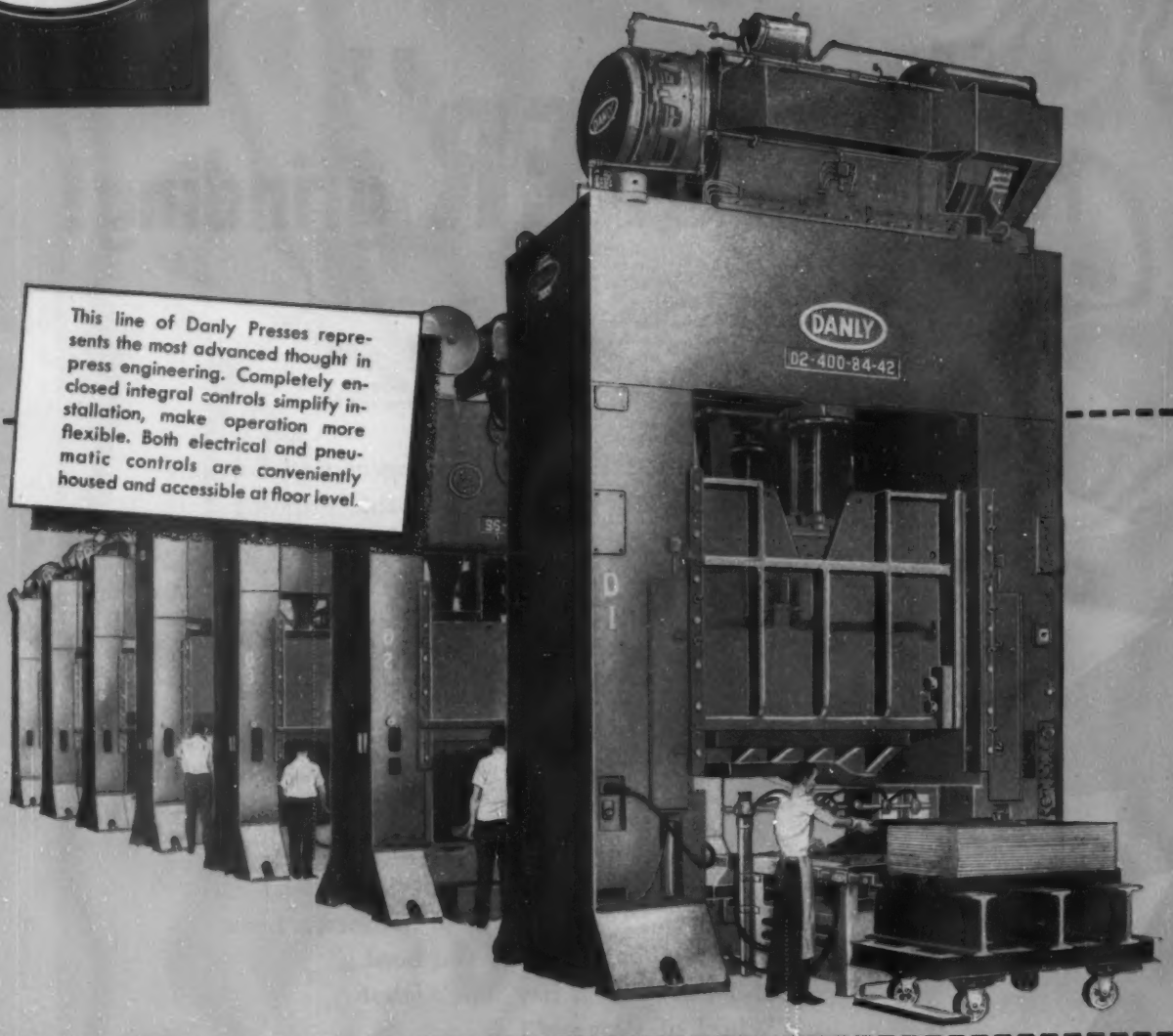
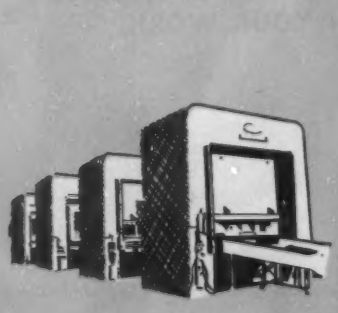
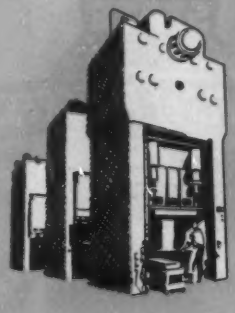
# DANLY

This line of Danly Presses represents the most advanced thought in press engineering. Completely enclosed integral controls simplify installation, make operation more flexible. Both electrical and pneumatic controls are conveniently housed and accessible at floor level.





Danly offers any press you need for blanking, drawing or any secondary operation . . . single, double or triple action . . . overdrive or underdrive . . . to suit your plant layout. Make your press line a Danly line and save costs at every stage of your stamping operation.

# Drawing

## COSTS LESS ON A DANLY PRESS

***When you get a tough draw job . . . put it on a Danly***

Danly Presses reduce the cost of your drawing operations by producing more stampings per shift. Their proved mechanical worth adds up to greater production, fewer shutdowns.

The line of Danly Underdrive Presses below is headed by a Triple Action Danly that actually doubles production. Eliminating what is normally a choke point, this Danly draw press is equipped with a special slide motion that permits faster stroking without exceeding safe drawing speeds. The output from this press keeps the whole line of secondary operation presses working steadily at full capacity.

At the left is another line of Danly Presses headed by a top drive double action draw press. This line represents the most advanced thought in press engineering. Totally enclosed and integral controls make installation practically a "plug-in" job. Operation is easier, safer—less maintenance is required.

All Danly Presses are built heavier to stand up under continuous peak load operation. Automatic oil lubrication adds hours of production time to every working day. No matter what your stamping requirements are, Danly Presses will reduce your costs. Call a Danly press engineer today.

**DANLY MACHINE SPECIALTIES, INC.**
2100 South Laramie Avenue, Chicago 50, Illinois

Danly Underdrive presses like these are the new answer to mass production of large stampings . . . they double output of the entire line, require less floor space and are designed especially for automation.

DANLY

# BIGGEST!

This Betts 100 Inch Worm and Rack-driven Slotter is the largest ever built in America.

It is more than 30 feet high and weighs over 140 tons.

The table has a load carrying capacity of 75 tons and the bed measures 9 feet across the ways.

Seventeen motors are required for its operation.

CONSOLIDATED MACHINE TOOLS

This big Betts Slotter has a reversing planer-type variable-voltage motor drive. All machine functions are push button controlled and the circular work table has General Electric ultra-precise electronic indexing.

CONSOLIDATED MACHINE TOOL

*Wholly owned subsidiary of Farrel-*

CORPORATION, ROCHESTER, N.Y.

*Birmingham Company, Incorporated.*

**B SERIES** • Light duty, one direction ball thrust bearing. Flat seat. Flat races. Bronze ball retainer . . . 38 sizes ½" to 3½" I.D.

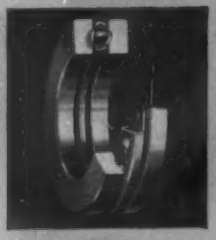
**C SERIES** • Light duty, one direction ball thrust bearing. Flat seat. Flat races. Pressed steel retainer . . . 16 sizes ½" to 1⅞" I.D.

**F SERIES** • Light duty, one direction thrust bearing. Flat seat. Grooved races. Pressed steel retainer . . . 43 sizes ½" to 3½" I.D.

**G SERIES** • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 76 sizes ½" to 7¾" I.D.

**E SERIES** • Medium duty ball thrust bearing. Banded. Flat seat. Grooved races. Full complement of balls . . . 40 sizes ½" to 3½" I.D.

**1000 SERIES** • Light duty ball thrust bearing. Flat seat. Grooved races. Pressed steel retainer. Metric standard . . . 26 sizes 10 to 125 mm. I.D.



**1100 SERIES** • Medium duty ball thrust bearing. Grooved races. Pressed steel or bronze (large sizes) retainer . . . 23 metric sizes 10 to 140 mm. I.D.

**1400 SERIES** • Medium duty. Grooved races. Spherical seat. Pressed steel or bronze (large sizes) retainer . . . 23 metric sizes 10 to 140 mm. I.D.

**W SERIES** • Case hardened and ground flat washers for various Thrust and Spacer applications. Slip fit. 38 sizes ½" to 3½" I.D.

**R SERIES** • Ball thrust retainer. One piece, pressed steel, channel type cage . . . 79 inch sizes 0.266" in 4.232" I.D.

Judged by every quality and performance standard Aetna bearings measure up to modern industry's increasingly exacting needs. That's why Aetna has a customer list that reads like Who's Who in American Industry—why 80% of Aetna's business comes from firms it has served for 20 or more years. Aetna has specialized on the advanced development, production and application of high precision anti-friction products for nearly four decades. Be sure to give this valuable background of experience your serious consideration when planning improvements of your present products or developing new ones for future production. We welcome your inquiry.

**CLUTCH BEARINGS** • Ball thrust clutch release bearing. Banded. Pre-lubricated. T-type, oil impregnated bronze retainer assures concentricity and smooth, quiet, long-life performance.

**Aetna**

*Precision Bearings and Parts for Every Branch of Industry*

**AETNA BALL AND ROLLER BEARING COMPANY**

DIVISION OF
PARKERSBURG-AETNA CORPORATION

4600 SCHUBERT AVENUE
CHICAGO 39, ILLINOIS

**SPECIAL BEARINGS** • Facilities for sizes up to 38" O.D. Counsel that brings you the expert technical aid that has licked many of industry's toughest bearing application problems.

**PRECISION PARTS** • Aetna is versatile—can mass-produce vital parts in almost limitless sizes and shapes—to your most exacting metallurgical, tolerance and finish specifications.

***Write*** for latest catalog. Contains specifications on Aetna's complete line—vital technical reference data on bearing selection, load capacities, lubrication, care and maintenance.

# ATRAX IN ACTION

## $3,000 SAVINGS IN LABOR WITH $100 WORTH OF CARBIDE BURS

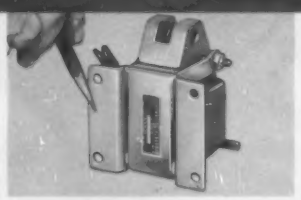
**A CASE HISTORY:** One of our customers had an extremely difficult problem of burring some piece parts after assembly. After consultation with Atrax engineers, it was determined that Solid Carbide Burs were the only type that could be used to salvage this huge job. Six Carbide Burs were bought for this job, totalling approximately $100.00. They saved the company over $3,000.00 in labor. Besides this, they made possible salvage of very valuable piece parts for a very nominal original investment.

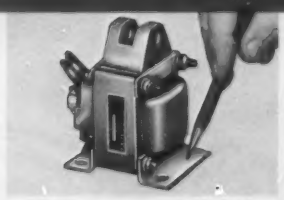
***Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.***

**NEW! Complete 88-page Manual and Catalog of Carbide Tools. Write for your free copy.**

**THE ATRAX COMPANY** NEWINGTON 11, CONNECTICUT

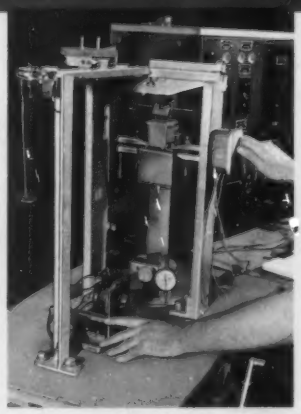
GREATER FLEXIBILITY





New General Electric solenoids mount in five positions — end, right- or left-side, throat, or with thru-bolts. Both leads and built-in terminal board on strongbox coils give added flexibility.

LONGER LIFE



Laboratory tests proved the new strongbox solenoid has much longer life. Long life results from design features such as strongbox coil, and double-strength, spring-steel mounting brackets.

# G. E. ANNOUNCES

# NEW STRONGBOX SOLENOIDS

The all-new line of General Electric industrial solenoids was designed to include the features you requested. From your requirements, design specifications for the new line were written — and here is the new, more economical solenoid you asked for.

### GREATER FLEXIBILITY

New solenoids mount in five positions. Mounting brackets can be moved to any of the four sides, or thru-bolts can be used. Both leads and built-in terminal board on strongbox coils make either type wiring immediately available.

### LONGER LIFE

New General Electric solenoids last longer because of new design components. Strongbox coils, enclosed layer wound Formex* windings, give long electrical life. New double-strength, spring-steel mounting brackets contribute to added life. New design also includes glass fabric plunger guide, and larger linkage-pin hole.

### COMPLETE RATING COVERAGE

Complete coverage is supplied by nine ratings in each of the following forms (nominal ratings at maximum stroke).

3.0 to 40 lbs in ½ inch pull forms
1.4 to 36 lbs in 1 inch pull forms
2.0 to 33 lbs in ½ inch push forms
4.3 to 28 lbs in 1 inch push forms

Sizes are available in 60, 50 and 25 cycle, and d-c forms. Voltage ratings are from 24 to 600 volts.

### SMALLER SIZE

22 percent smaller for the same power ratings, new General Electric solenoids will reduce space problems when mounting solenoids in your equipment. Smaller enclosures and reduced material costs make new solenoids more economical.

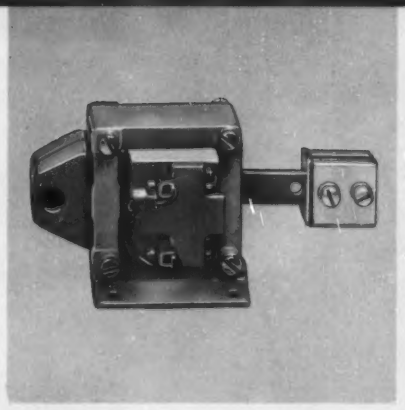
FOR MORE INFORMATION contact your nearest Apparatus Sales Office, or Distributor, or write Section 730-58, General Electric Company, Schenectady 5, N. Y. Ask for Bulletin GEA-6215.

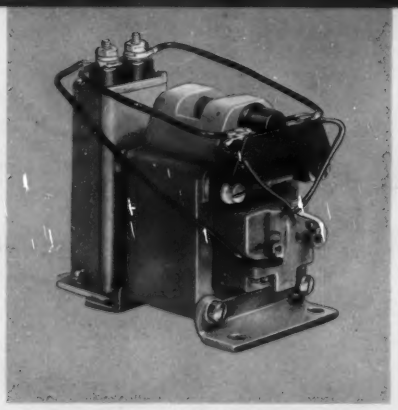
*Reg. Trademark. General Electric Co.

*Progress Is Our Most Important Product*

# GENERAL ELECTRIC

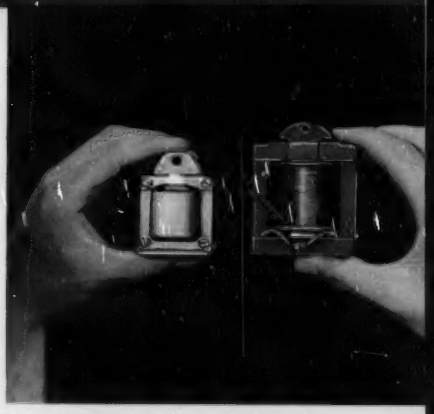
COMPLETE RATING COVERAGE





Supplied by nine force ratings in each of the forms, new strongbox solenoids are available in both push and pull forms, at one-half and one inch strokes. All these sizes are available in d-c, 25, 50, and 60 cycle a-c, with voltage ratings from 24 to 600 volts.

SMALLER SIZE



22% smaller for the same power ratings, new General Electric solenoids will reduce space problems in your equipment.

# here's a "hole" lot of versatility...

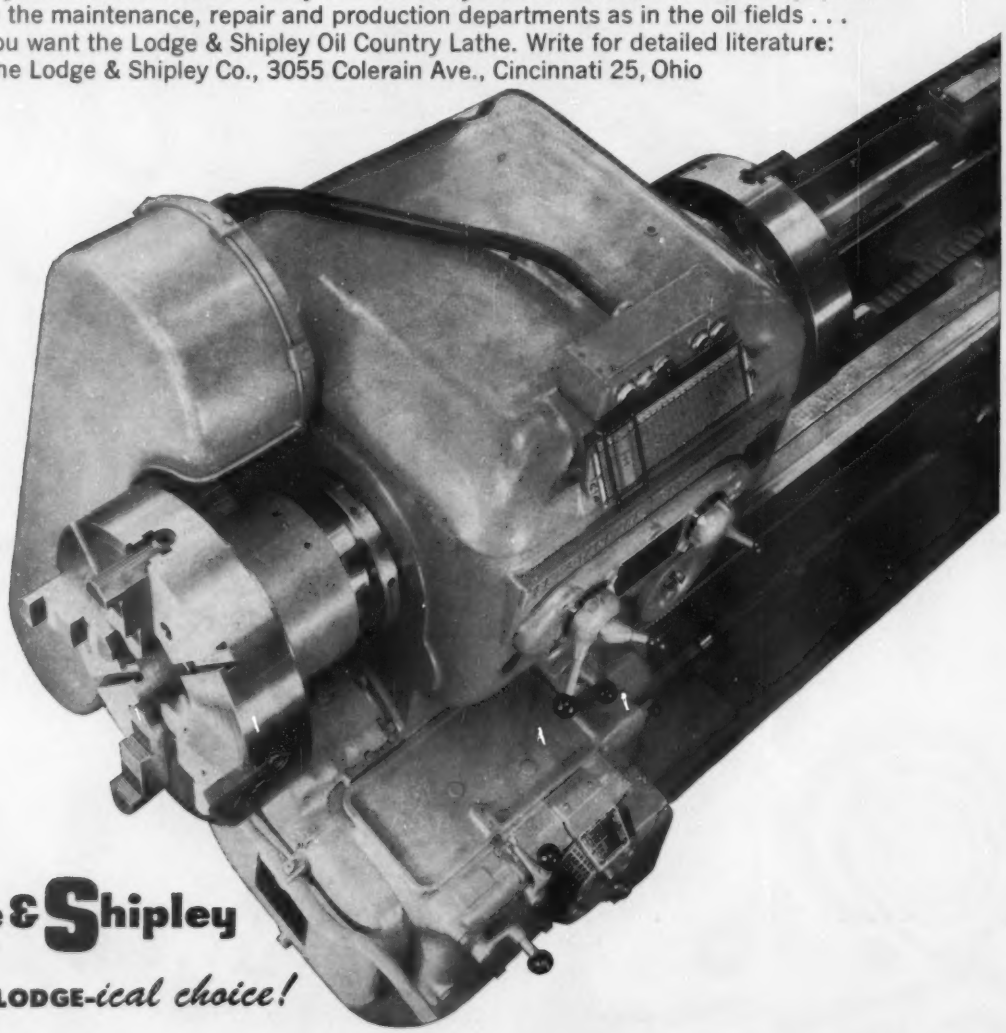
# Lodge & Shipley OIL COUNTRY LATHES

The Lodge & Shipley Oil Country or Hollow Spindle Lathe is like two lathes in one. Very long pieces . . . far longer than the normal center-to-center distance . . . can be chucked right through the large hole in the spindle. You save capital investment and floor space too! Add a headstock collet and center and you can do all normal between-center work.

The two-speed drilling tailstock makes drilling easy . . . you can feed even a 6-inch drill into solid steel stock.

The leadscrew is reversible, end-for-end. This unique Lodge & Shipley feature doubles leadscrew life.

If you want extreme versatility . . . versatility that has made this lathe as popular in the maintenance, repair and production departments as in the oil fields . . . you want the Lodge & Shipley Oil Country Lathe. Write for detailed literature:
The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio

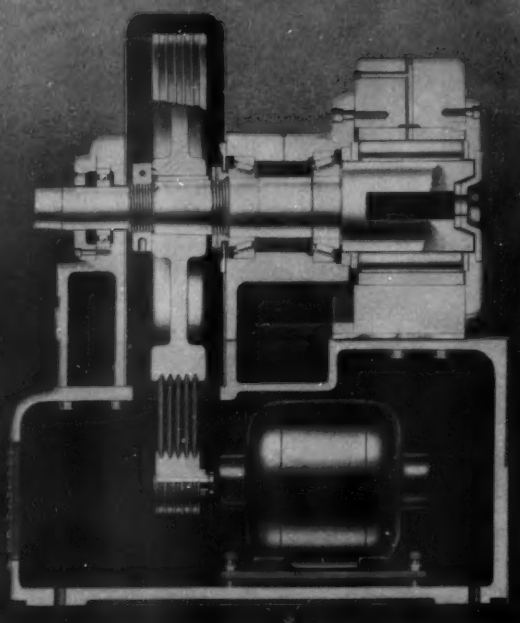


**Lodge & Shipley**

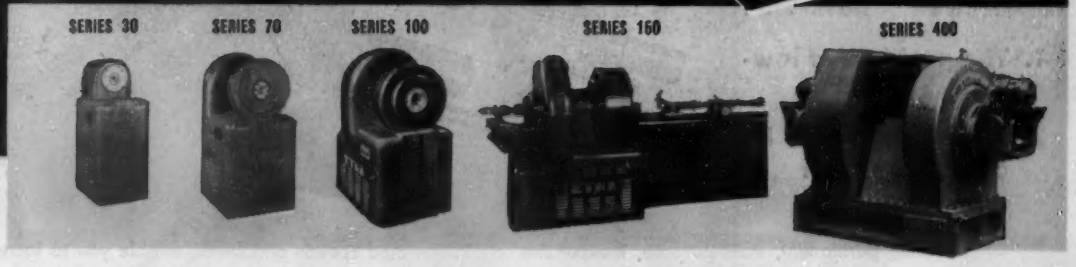
*....your* **LODGE**-*ical choice!*

# IF IT'S SWAGING... It's Etna..

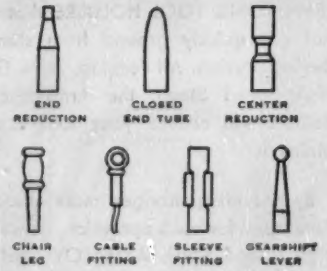
## FOR CONTINUOUS PRECISION PRODUCTION!



**A COMPLETE RANGE OF SIZES AND CAPACITIES**




For tapering, sizing, reducing and forming to special shapes of round solids and steel tubing, the Etna Swaging Machine offers the ultimate in modern machine design. Regardless of size and description of the job to be done, there's an Etna swager right for *greater production*. Write today regarding your specific job problems.




**It's New! Get full information on the blending into the wall of I. D. Bead on steel and stainless steel tube with Etna Swagers resulting in mirror finish. Bead also removed on conduit.**

# Abbey ETNA Company

**3404 MAPLEWOOD AVE., TOLEDO 10, OHIO**

# ARMSTRONG

## ARMSTRONG TOOL HOLDERS

**answer both . . .**

1. **The problem of lowering costs**
2. **The problem of increasing output**

By providing permanent, multi-purpose, inexpensive ARMSTRONG TOOL HOLDERS that use cutters or bits that are quickly ground from standard high speed Shapes (Saving: All Forging, 70% Grinding and 90% High Speed Steel), the Armstrong System of Tool Holders will reduce your tool cost to an absolute minimum.

By providing stronger, more efficient tools, carefully developed for each operation, as well as ARMSTRONG High Speed Steel, ARMALOY Cast Alloy Cutter Bits or Armide Carbide-Tipped Cutters as required for each job, ARMSTRONG TOOL HOLDERS permit greatly increased speeds and feeds, enable you to increase the hourly output of every lathe, planer, slotter, shaper, turret lathe and screw machine.

There is no surer way to lower costs and increase output, than to use the correct ARMSTRONG TOOL HOLDER for each operation on all machines.

*Stocked by Leading Tool Departments*

**ARMSTRONG BROS. TOOL CO.**

*"THE TOOL HOLDER PEOPLE"*

5215 W. Armstrong Ave. Chicago 30, U. S. A.

*New York and San Francisco*

***Write for Catalog.***

# UNION

## ANNOUNCES

# COUNTERBORES

## WITH INTERCHANGEABLE PILOTS

Out of significant knowledge gained in making a wide variety of high precision cutting tools comes Union's High Speed Steel Counterbore with Interchangeable Pilots. Available in standard and aircraft designs. Call or write your Union Distributor for full information.

**UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS**

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BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

YOUR DISTRIBUTOR IS READY TO SERVE YOU PROMPTLY FROM FULL STOCKS

# This Totally Enclosed Quick Change Box

It is normally found only on more expensive lathes. It has an automatic lubrication system. All gears in it are shaved and flame hardened. All shafts are integrally splined for extra strength. There are 48 different threads and feeds obtainable through this compact unit. It can be converted in 15 minutes to cut a full series of metric leads.

## Is Standard on 10" Cincinnatis costing only $1793*

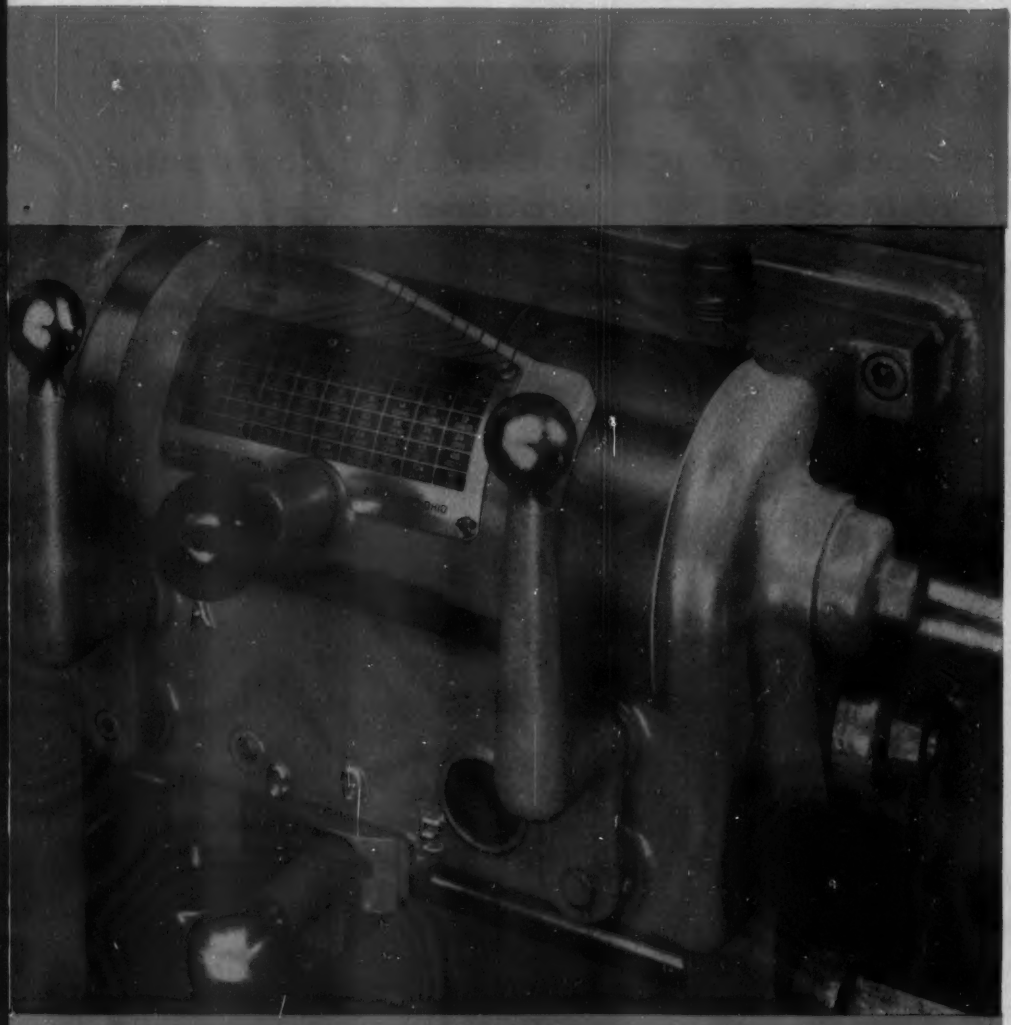
Invest your lathe dollars wisely in a machine which can be busy 100% of the time. "Cincinnatis" save you hundreds of dollars in first cost . . . and return your investment faster. They're the only low-priced lathes with high-priced features.

*10" x 24" std. drive, FOB factory.
Price subject to change without notice.

For complete catalogs, prices and name of your local dealer, write on company letterhead: Cincinnati Lathe & Tool Co., 3251 Disney, Cincinnati 9, Ohio.

1. All-geared headstock
2. 12 spindle speeds in geometric progression
3. Direct-reading speed-shifting mechanism
4. Large spindle mounted in three antifriction bearings
5. Flame-hardened gears in headstock, quick change box and apron
6. Cabinet legs with built-in leveling jacks
7. One shot lubrication of ways
8. Ground ways (flame hardened at extra cost)
9. Tray-Tops on headstock and tailstock
10. Double walled apron with automatic lubrication
11. Fully enclosed electrical panel, built-in disconnect, transformer, motor and controls (all standard equipment)

Cincinnati Tray-Tops: engine, toolroom, gap bed 10", 12½", 15", 18" swing.
Cincinnati Model LT: engine, gap bed 16", 18", 20", 24" swing.

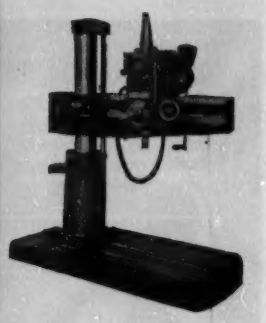


center on . . .

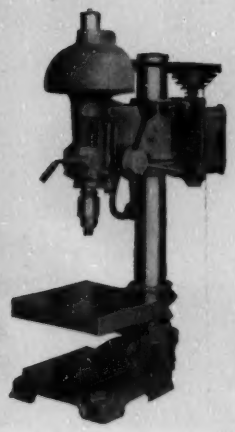
# cincinnati lathes and drills

For a clear comparison of Cincinnati Lathes with other equipment, write for a free copy of "Management Facts About Lathes".

**There is also a complete line of Cincinnati bench, floor and radial drilling machines**



3'7" Radial Drill



16" Royal Bench Drill

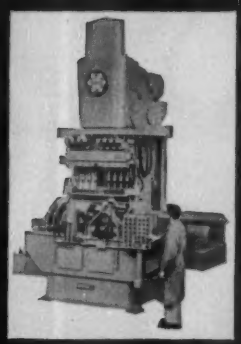
21" Sliding Head Box Column Floor Drill

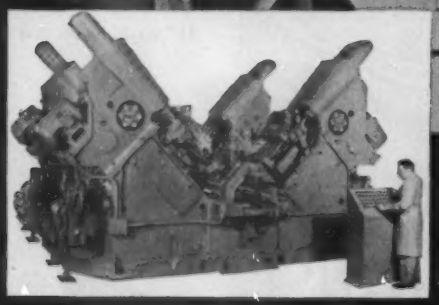
FOR

# *Production • Accuracy • Economy*

## V-8 Cylinder Blocks are MICROHONED Automatically on NEW Model 420 Hydrohoners ☆

*Specifications of this model are included in our general catalog—obtainable at the offices listed below.*





This multiple-spindle, heavy-duty model is designed to fit any type of production line. Examples of its adaptability: above, two four-spindle machines with tip-up fixtures; left, V-type; upper right, eight spindle vertical.

1929 • 1954 — PRECISION PRODUCTION THROUGH MICROHONING — MICRO MATIC — TRADE MARK — 25TH YEAR OF DEVELOPMENT

## MICROMATIC HONE CORPORATION

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MICROMATIC HONE CORP.
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REPRESENTATIVES: Allied Northwest Machine Tool Corp., 103 S.W. Front Ave., Portland 4, Oregon • Mason Machine Tool Company, 415 So. Second East, Salt Lake City, Utah • Tidewater Supply Co., Charlotte 4, North Carolina

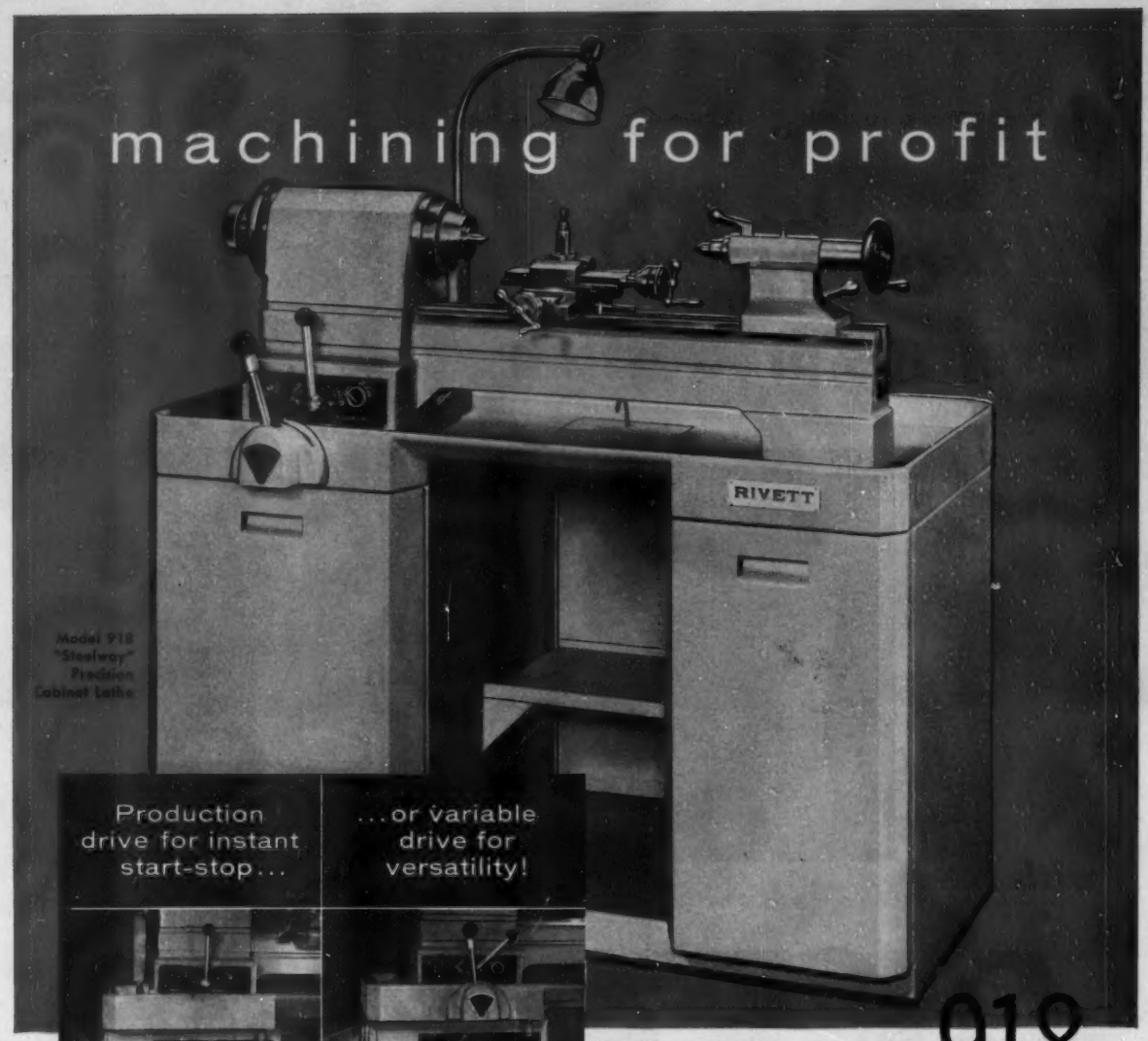
REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

SUBSIDIARY:

***Micro-Precision Inc., 2205 Lee Street, Evanston, Illinois***

*Hydraulic Controls • Diesel fuel injection equipment*

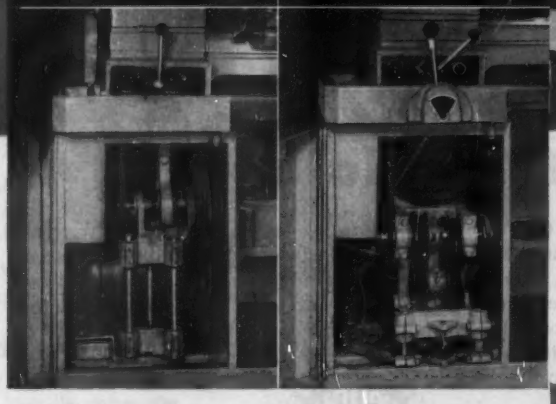
# machining for profit




Model 918 "Steelway" Precision Cabinet Lathe

Production drive for instant start-stop...

...or variable drive for versatility!



**RIVETT 918**

*earns money—produces at rates to permit surpassing your competition!*

**RIVETT**

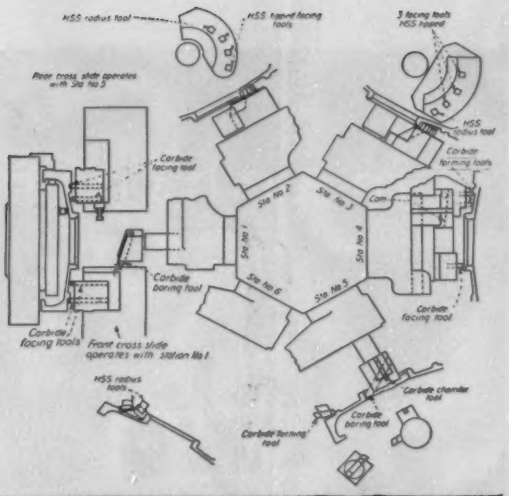
Use a modern lathe—consistent in size with the work to be done. Gain advantage of time-saving features—to reduce operator effort, lessen time between set-ups, permit a faster rate of production!

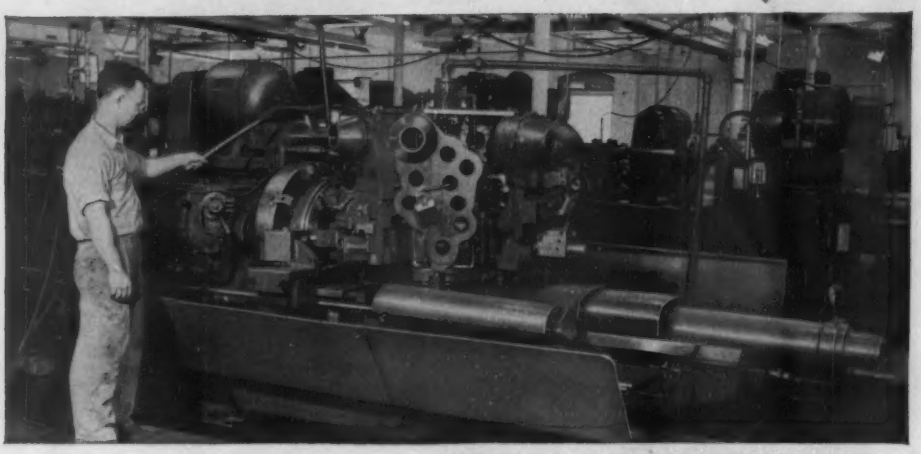
The Rivett 918 offers this opportunity. Many shops are taking advantage of it. Why don't you?

*Write for Bulletin 918-SLB and see →*

RIVETT LATHE & GRINDER, INC.—DEPT. AMIII, BRIGHTON 35, BOSTON, MASS.

# how *Curtiss Wright* increases production



Note setup using both HSS and carbide tools to handle rough and finish cuts including 2 stations which sweep a circular swath about 2" wide.

**with the**

# FASTERMATIC

## automatic turret lathe

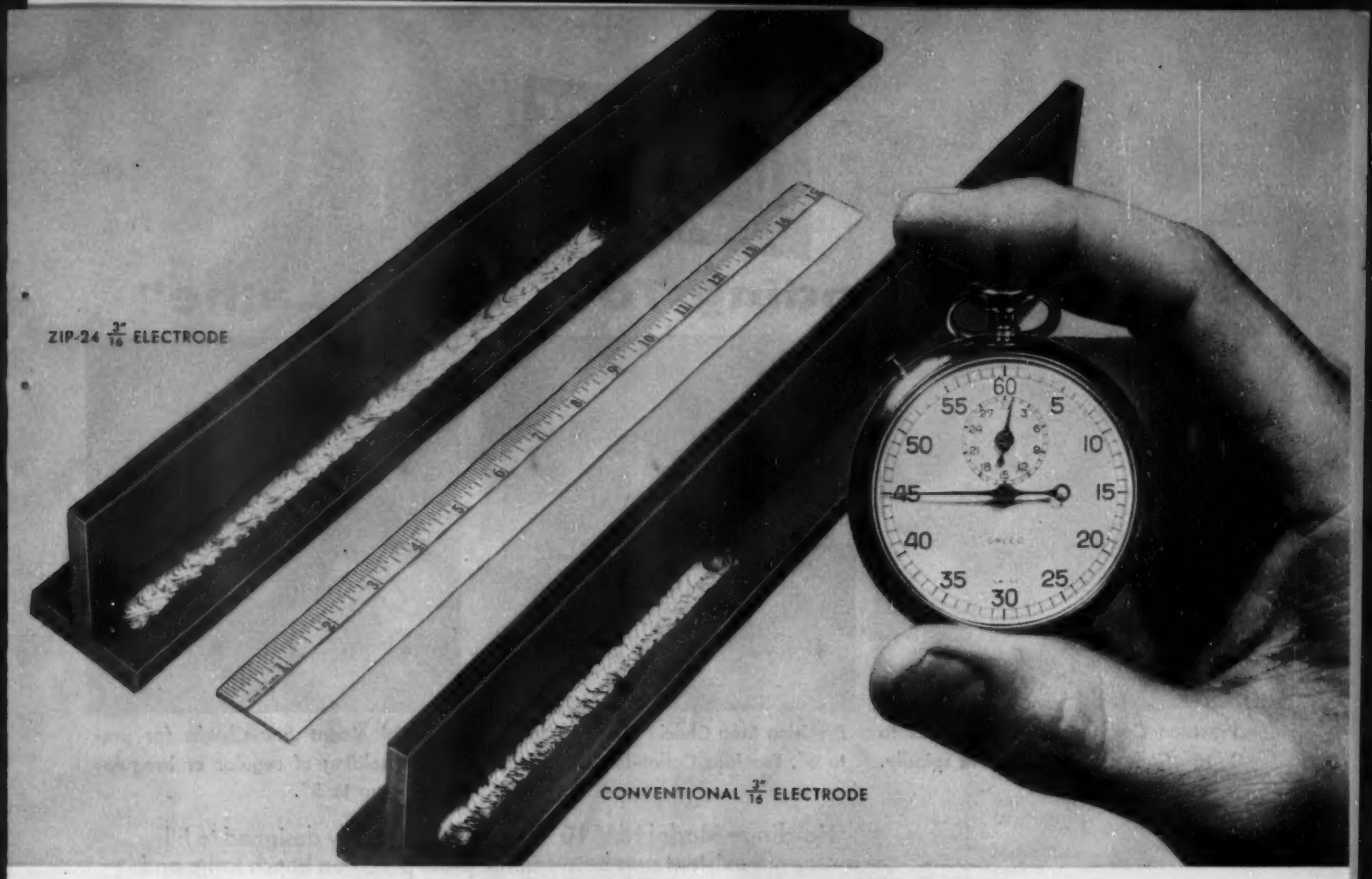
It's a complex machining job, this front end section for an aircraft engine. But the Fastermatic does it at a fast rate, handling 20 cuts in 37 minutes. That's because the Fastermatic has the rigidity to take multiple cuts at high speeds with carbide tools. What's more, it's all automatic operation.

Once the job is set, the machine does all the work—efficiently, and with repeat accuracy, piece after piece. Why not find out what it can do to increase your production and cut your costs?

**THE GISHOLT ROUND TABLE**
*represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

**GISHOLT MACHINE COMPANY**
**Madison 10, Wisconsin**

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES




# New Westinghouse ZIP-24 Electrode welds twice as fast—better, easier, too

The greatest advancement in mild steel welding electrodes in years. That's what Westinghouse research, plus years of experience as an actual user of welding processes, has made the new ZIP-24. It now gives you a greater combination of plus features than any other powdered iron electrode. For example:

FASTER WELDS—*50 to 70%* greater deposit rates. And an increase of *30 to 50%* in footage of fillet or lap weld per minute.

BETTER WELDS—balanced fillets give appearance of "machined finish" . . . no undercut with fillet and lap welds . . . perfect wall wash-up . . . easier slag removal . . . minimum spatter loss that reduces cleaning time. And if that's not enough . . .

EASIER WELDS—even-edged, smooth, finely rippled weld beads even when handled by an inexperienced operator. It's ideal for "drag" technique . . . gives greater flexibility in weld types . . . can be used with either a-c or d-c. And it's available now for . . .

IMMEDIATE DELIVERY—made possible with the opening of our second electrode plant . . . a brand-new Westinghouse Electrode Plant at Montevallo, Alabama. Over 57,000 square feet of additional manufacturing space to give you immediate delivery on the new ZIP-24 and the complete line of quality electrodes . . . *manufactured by Westinghouse.* J-21859

**LEARN MORE ABOUT THE NEW ZIP-24 ELECTRODE!**

YOU CAN BE **SURE**...IF IT'S **Westinghouse**

**WESTINGHOUSE ELECTRIC CORPORATION**
**Welding Department, P. O. Box 868, Pittsburgh, Pa.**

Please send me a copy of your new folder on the ZIP-24 electrode (B-6389).

☐ I would like free samples of the new ZIP-24 electrode.

☐ Send me literature on the complete line of Westinghouse Electrodes (B-6070).

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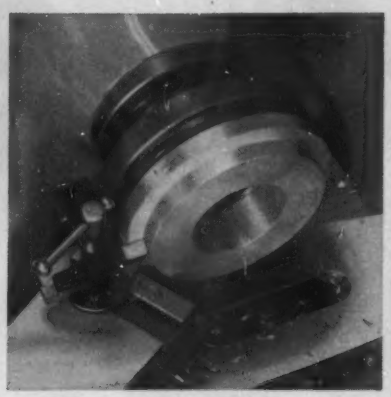
HARDINGE
ELMIRA, N.Y.

# "The Outstanding Tool Room Lathe"

Precision Collet work for all sizes to 1/16" Collet seats *directly* in spindle.



Precision Step Chucks for diameters up to 6". Provides Collet-like accuracy.

Integral Mount Jaw Chucks for precision holding of regular or irregular shapes up to 5".

**Hardinge Model HLV 10" Lathe** was primarily designed to fill a very old existent gap between the plain precision bench lathe and the heavy duty engine lathe.
Extreme accuracy, high spindle speeds, and thread cutting ability are coupled with power and ease of operation to obtain the desired results rapidly.

*Write for Bulletin HLV*

**HARDINGE BROTHERS, INC., ELMIRA, N. Y.**

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.

# eliminate the guesswork in selecting tool steels

Thousands of metal working people are using the Crucible Tool Steel Selector to determine exactly which type of steel they need. This handy selector covers 22 tool steels which fit 98% of all tool steel applications.

The selector is unique because it starts with the ultimate use of the steel. It breaks down all tool steel applications into six major classifications, under which the different grades of steel available for certain specific requirements are indicated in legible cutouts. Heat treatment and machinability data are also included for each grade.

A flip of the dial will give you the answer, and almost just as quickly you can get the steel you select. For each type of steel shown on the selector is in stock in Crucible warehouses, conveniently located throughout the country.

To get your Selector merely fill in the coupon and mail. There is no obligation whatsoever.

⅓ actual size, Selector is in 3 colors

**HERE'S AN EXAMPLE:**

**Application — Deep drawing die for steel**

**Major Class — Metal Forming — Cold**

**Sub-Group — Special Purpose**

**Tool Characteristics — Wear Resistance**

**Tool Steel — Airdi 150**

**A turn of the dial does it! And you're sure you're right**

Crucible Steel Company of America
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Company_____ Title_____

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**CRUCIBLE** first name in special purpose steels

54 years of Fine steelmaking **TOOL STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.

Through specialization, Card is better prepared to fulfill your most exacting threading requirements.

# TAPS *by* CARD

*Completely stocked offices at Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle*
**See your local Card distributor for prompt deliveries and helpful service**

**S. W. CARD MANUFACTURING CO., MANSFIELD, MASS.** • DIVISION OF UNION TWIST DRILL CO. **TAPS • DIES • SCREW PLATES**

# Caterpillar

## gets fast, accurate, heavy duty drilling with

# Carlton

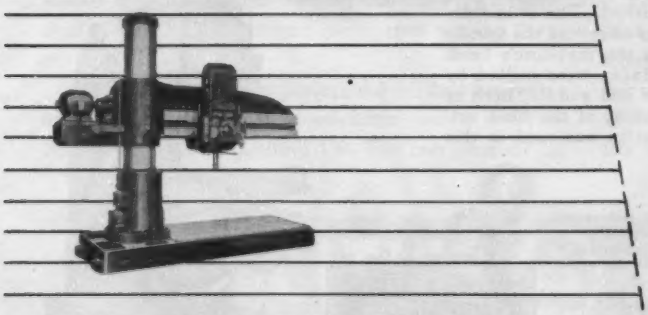
## *radial drills*

Carlton 3A radial drill at Caterpillar Tractor Co., boring bearing diameters and drilling and tapping holes over 1" in diameter in a cast iron gear housing cover.

Drilling at Caterpillar Tractor Co. is strictly large scale . . . yet it must be fast and accurate. That's why Caterpillar uses Carlton Radial Drills. Carlton has everything you need for today's hole drilling precision and production: pushbutton control, super-precision column clamp, 3-unit power clamping, low hung drive, positive tooth feed clutch and easy, economical maintenance.

You're sure to find your most economical size here, too, because the Carlton line includes arm lengths from 3-ft. to 12-ft., column diameters from 9" to 26".

Check Carlton . . . the *one* radial drill that assures you of maximum hole drilling production, precision performance today and tomorrow, and owner *and* operator satisfaction. Why not write today for the 'hole' story.



**The Carlton Machine Tool Co., Cincinnati 25, Ohio.**

**The Carlton Machine Tool Co.** Cincinnati 25, Ohio

Please send us descriptive bulletins on Carlton radial drills in sizes indicated:

| Arm | Column |
|---|---|
| ____ft. | ____in. |
| ____ft. | ____in. |
| ____ft. | ____in. |

Name_____

Company_____

Street_____

City_____ Zone____ State_____

# Production time reduced by 53%!

(A) 6" (B) 4⅝" (C) 3¼"
(D) —1" + ± .000
(E) —1" + ± .005 (F) ⅜"

**OPERATION 1** — Rough mill one side of tongue.
*PROCEDURE*—Offset spindle slide radius (A), set rotary head to angle (B), feed table to work-piece centerline (C to D).

**OPERATION 2** — Rough mill radius section between tongue.
*PROCEDURE* — Rotate head from angle (B) to angle (E).

**OPERATION 3** — Rough mill one side of opposite tongue.
*PROCEDURE* — Feed Machine table from (D) to (F).

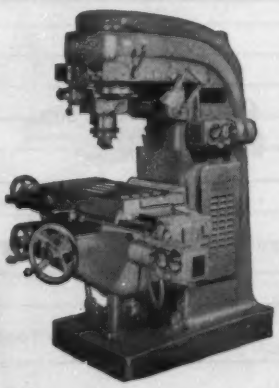
**OPERATION 4** — Rough mill end of tongue.
*PROCEDURE* — Feed machine saddle from (F) to (G).

## Rotary Head Milling Machine simplifies method, cuts costs on still another production job.

IN the production milling of this Quick Change Clamp Collar, considerable savings were effected by using a Kearney & Trecker No. 2 Model D Rotary Head milling machine. The entire milling operation on each piece required less than 16 minutes and still maintained the prescribed accuracy. Previous time was 34 minutes.

The job was done faster on the Rotary Head machine than would be possible with any other method. The radii were produced merely by offsetting the spindle slide and rotating the machine's head. The straight surfaces were milled by moving the table and saddle, both of which are independent of the head setting. Only one cutter was used in this single set-up. Think of what this means not only in this job, but also in terms of increased range of operations for other work.

Get the Rotary Head Milling Machine Production Idea Booklet. It contains several examples of how this method has been found exceptionally efficient in solving production problems. It's yours for the asking. Write Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.



**OPERATION 5** — Rough mill second half of inner contour.
*PROCEDURE* — Repeat Operations 1 through 4, working area to be in the lower half of opening.

**OPERATION 6** — Finish mill 4⅛" dia., end of tongues to 3¼" dimension and width of tongues to 1" + .000 —.005.
*PROCEDURE*—Reverse sequence of Operations 1 through 5.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

# What's Behind This Cutting Oil Picture?

Behind this cutting oil picture there's a story well worth telling . . . a story of 10 years' operation of the M. O. Devers Screw Machine Products Company.

During this time Devers has acquired and maintained a reputation for turning out the very highest quality precision machined parts and turning them out on time.

And during this same period, the oil that has helped Devers to achieve this enviable record is Cities Service Chillo #10 Cutting Oil. This one unusual oil has been used for work covering 1018, 1020, 4140, and stainless steel, and, says Devers official Harry E. McDaniel, "We have found it superior for all these machining operations."

For longer tool life, closer tolerances, and a simpler cutting operation, you—like the M. O. Devers Company—will find it profitable to investigate Cities Service Chillo Cutting Oils. Contact your nearest Cities Service representative or write Cities Service Oil Company, Sixty Wall Tower, New York 5, N.Y.

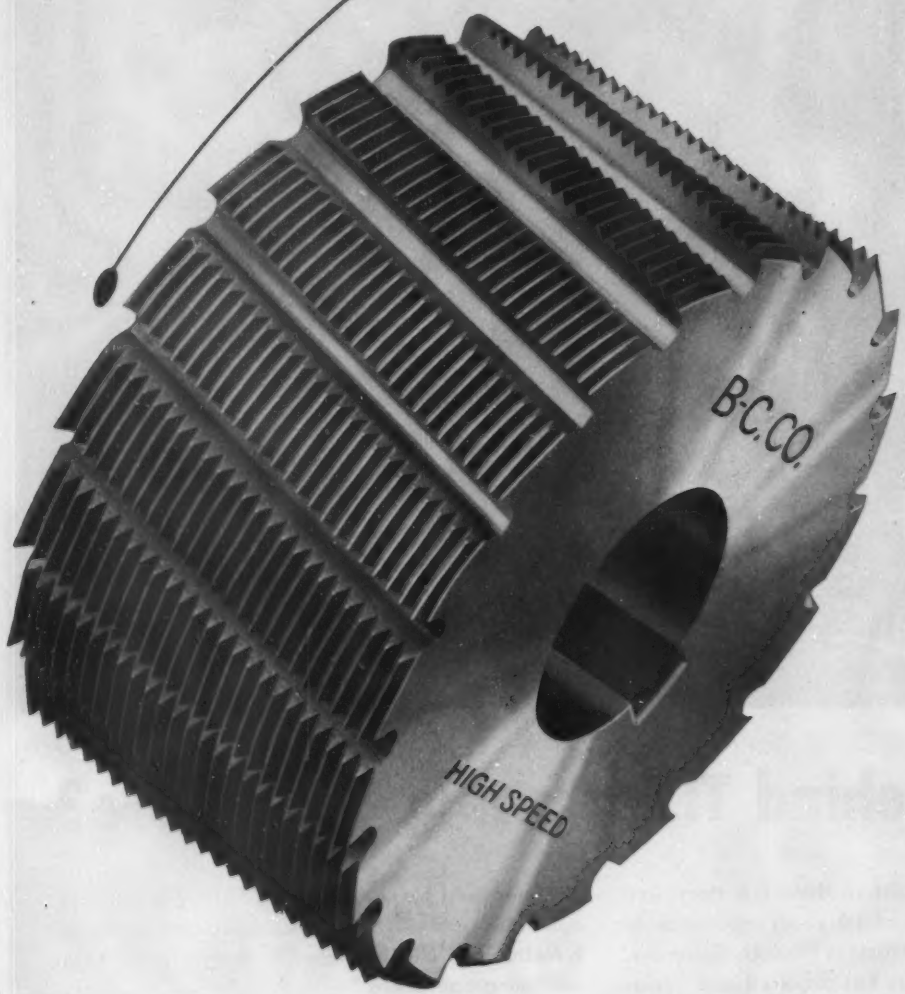
CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

*Barber-Colman*

# THREAD MILLS

*custom-built for high production, long cutting life, accurate threads*




Thread accuracy and economical cutting life are synonomous with Barber-Colman Thread Mills because cutters which mill smoothly and easily, without premature dulling, also cut threads more accurately.

Barber-Colman cutter engineers have developed new manufacturing techniques for producing precision thread milling cutters with unground teeth, straight or helical flutes in either shell or shank styles, which give unusual tool life. The finest ground thread mills are also available from coarse to very fine pitches.

For special help in thread milling problems consult your Barber-Colman representative. He is a specialist on accuracy and milling of threads.

BARBER COLMAN

**Barber-Colman Company**

GENERAL OFFICES AND PLANT, 9111 ROCK STREET, ROCKFORD, ILLINOIS

## One Priceless Element In Every

# POPE PRECISION SPINDLE

## THE *Confidence* OF ITS USER

You can have complete *confidence* in the anti-friction bearings POPE puts into your spindles.

They are made to new super-precision tolerances.

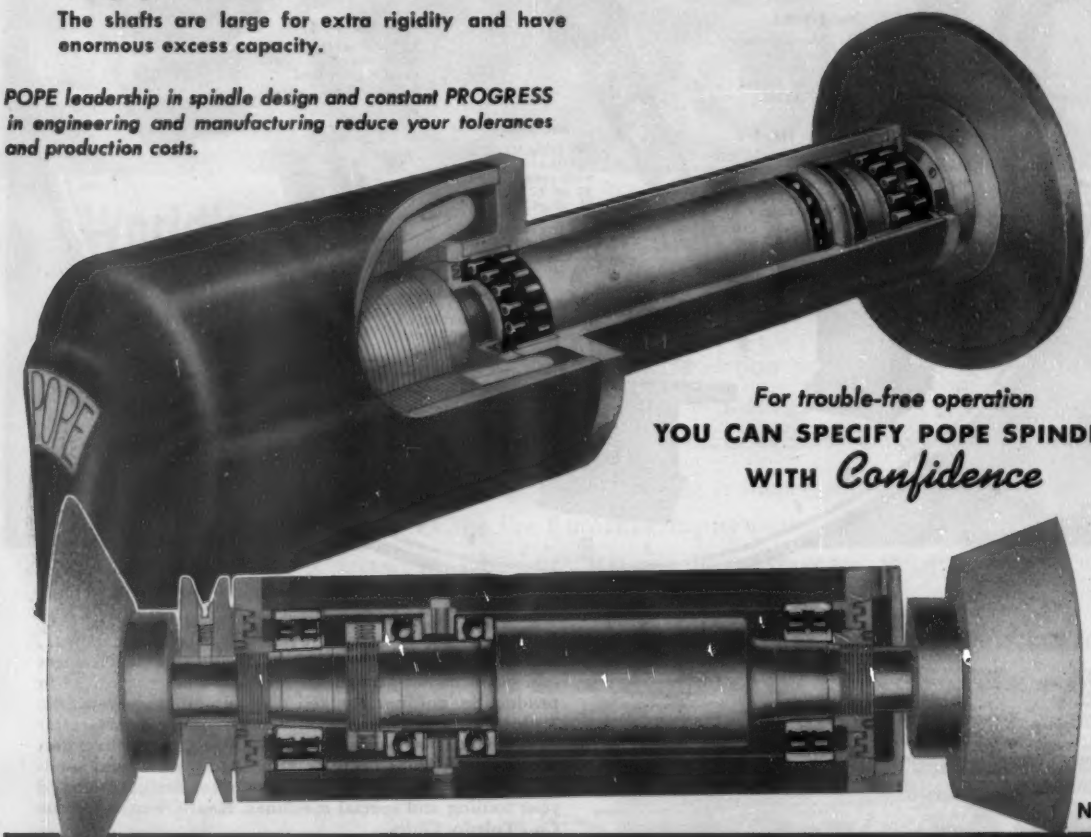
You can depend upon Pope Spindles for the continuous production of accurate parts, fast removal of the surplus metal and fine *low* micro-inch surface finishes.

POPE Spindles have radial and axial rigidity capable of properly supporting modern cutting tools on high production work.

The shafts are large for extra rigidity and have enormous excess capacity.

***POPE leadership in spindle design and constant PROGRESS in engineering and manufacturing reduce your tolerances and production costs.***

**With the POPE SYSTEM of Grease Lubrication used successfully for thirty-four years, there is no internal radial clearance for oil film in the bearings — none is required. Instead, the bearings are permanently internally preloaded for accurate centering and positioning of the shaft.**




*For trouble-free operation*

**YOU CAN SPECIFY POPE SPINDLES WITH *Confidence***

No. 103

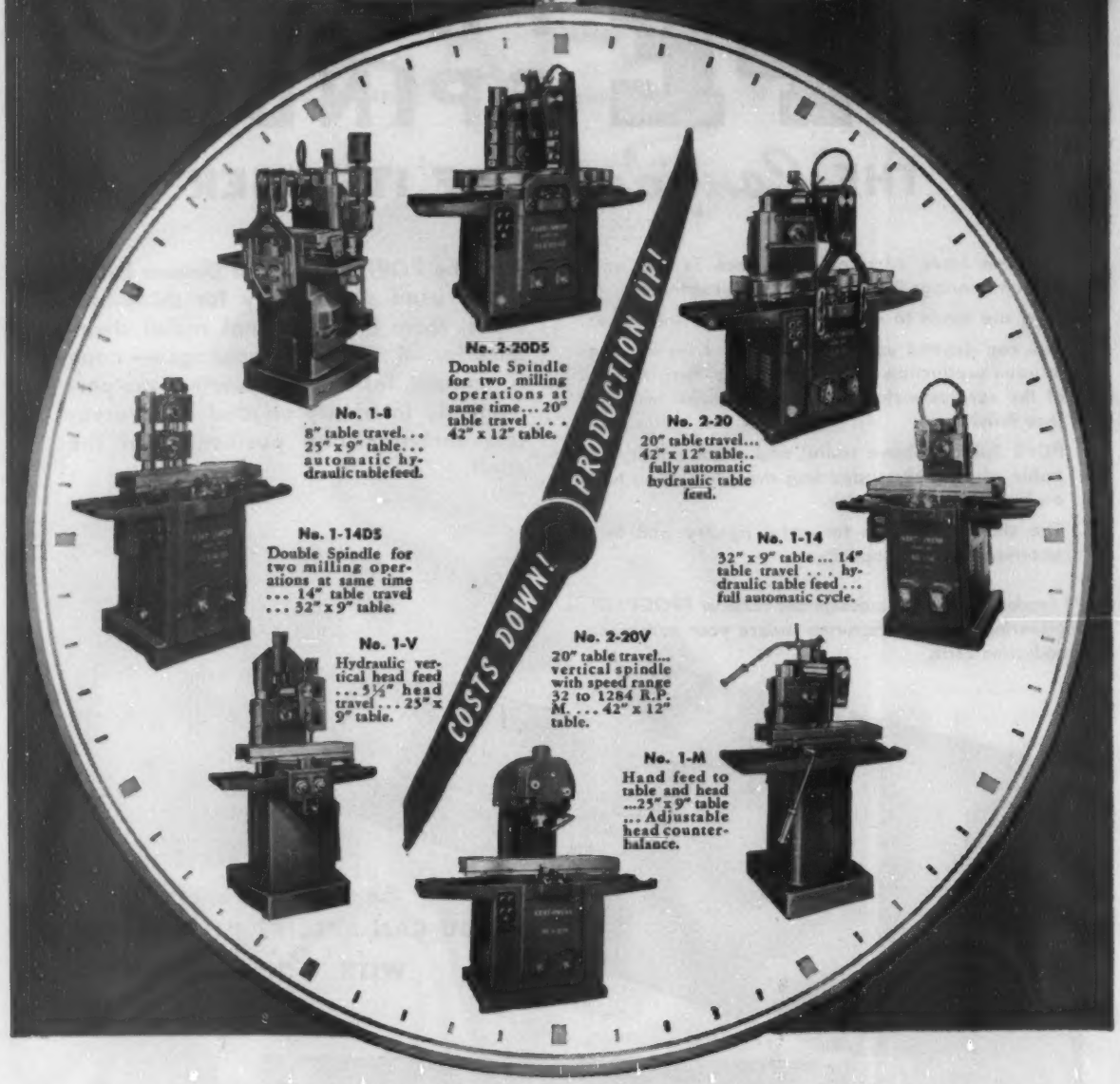
*Specify* **POPE** PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

# Time to Reduce Milling Costs!


COSTS DOWN!
PRODUCTION UP!
No. 2-20DS
Double Spindle for two milling operations at same time... 20" table travel . . . 42" x 12" table.
No. 1-8
8" table travel... 25" x 9" table... automatic hydraulic table feed.
No. 2-20
20" table travel... 42" x 12" table... fully automatic hydraulic table feed.
No. 1-14DS
Double Spindle for two milling operations at same time ... 14" table travel ... 32" x 9" table.
No. 1-14
32" x 9" table ... 14" table travel . . . hydraulic table feed ... full automatic cycle.
No. 1-V
Hydraulic vertical head feed ... 5¼" head travel ... 25" x 9" table.
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. ... 42" x 12" table.
No. 1-M
Hand feed to table and head ...25" x 9" table ... Adjustable head counterbalance.

## KENT-OWENS REPRESENTATIVES

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General Machinery Corp.

BUFFALO
Don W. Patterson

CHICAGO
Four States Mach'y Company

DALLAS
Hamer Machine Tool Co.

DAYTON
C. H. Gossage Mach'y Co.

DETROIT
A. C. Hohenbrink Mach'y Co.

FT. WAYNE
Ottis Machinery Co.

GRAND RAPIDS
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HAMILTON, ONT.
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Hannigan Machinery, Inc.

HOUSTON
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ST. LOUIS
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Charles Equipment Company

SYRACUSE
J. F. Owens Mach'y Company

TORONTO, ONT.
E. P. Barber Mach'y Company

WINDSOR, ONT.
E. P. Barber Mach'y Company

Kent-Owens machines assure you of speed with accuracy . . . and cut your milling costs! Designed with advanced features . . . performance-proved for meeting tough schedules in production milling. Rugged . . . simple . . . versatile. Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

*Call on*

# KENT-OWENS

*for Milling Machines*

# World's Fastest Method of Gaging Threads

## Taft-Peirce Rotochek Gages Threads 3 Times Faster

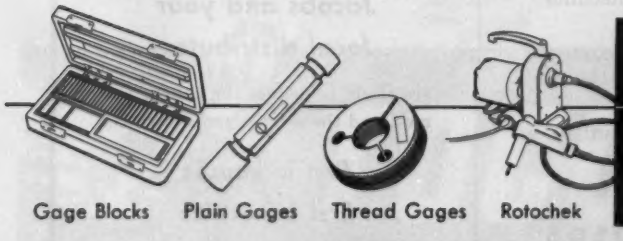
Flexible Shaft Model Rotochek

Bench Model Rotochek

You can triple your thread inspection rate with this simple, inexpensive device. A Rotochek is fast . . . accurate . . . easy to use. Operators report from 3 to 4 times as many parts inspected daily.

Simply push-pull and the part is inspected. Bring the part to the Rotochek, or the Rotochek to the part—a slight push and gage screws into the work. Release the pressure and the gage stops. Pull—and it disengages.

Available in bench model, or with gaging head on flexible shaft. Adaptors permit use of reversible thread members and ring gages. Send for bulletin with full description and prices.



Gage Blocks Plain Gages Thread Gages Rotochek

T-P means Top Precision

T P

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, R. I.

**TIGHTEN YOUR GRIP ON PRODUCTION**

Production flows faster and smoother when your machine tools are equipped with Jacobs Chucks.

Rugged construction, great gripping power and accuracy have made The Jacobs Plain Bearing Drill Chuck the choice of machinists throughout the world.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

**IF IT'S A JACOBS IT HOLDS**

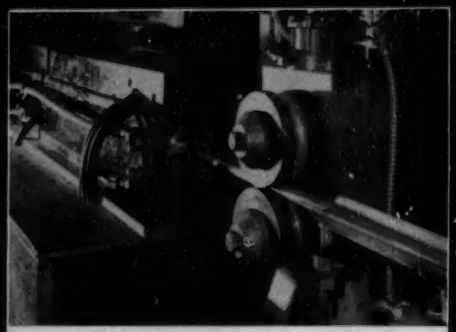
***Jacobs and your local distributor***

are ready to deliver the chucks you need and the service you deserve.

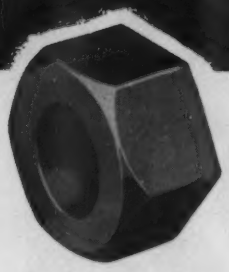
***. . . first in chucks***

***. . . first in service***

# 4200 Nut Blanks Per Hour



Feed rolls push barstock through TOCCO Induction Coils to heat stock to 2350°F for forging.



## with TOCCO* Induction Heating

**FASTER PRODUCTION**—4200 nut blanks per hour—twice the output of a conventional hot punching machine—that's the result of Lamson & Sessions Company's new automatic production set up with TOCCO Induction Heating.

**OTHER ADVANTAGES**—TOCCO delivers exact temperatures (2350°F, plus or minus 25°) and delivers them so fast that scale has little time to form. Scale loss has been reduced to only about 1% for hot-rolled stock. TOCCO is clean and cool, fits right into the production line—no hauling to and from the heat-treat department—no unpleasant radiant heat to annoy workers.

**HERE'S HOW IT WORKS**—Steel bars up to 1½" diameter are fed through TOCCO Induction Coils. The first two coils, operating off a 300 kw, three kc TOCCO motor-generator set, preheat the rod. The third coil which operates from a TOCCO 250 kw 10 kc generator then boosts the rod to forging temperature. The hot rod then is fed to the special hot nut former (designed and built by NATIONAL MACHINERY CO.) which shears the rod to suitable lengths, forms the part and spits out the nut blank—ready for tapping.

In your search to find sound methods of increasing production, improving products and lowering costs, don't overlook TOCCO Induction Heating. If your products require heat treating, soldering, brazing or forging, it will pay you to investigate TOCCO for better, faster ways of producing them at lower unit costs.

**THE OHIO CRANKSHAFT COMPANY**

**TOCCO**

*Mail Coupon Today*

**FREE BULLETIN**

THE OHIO CRANKSHAFT CO.
Dept. B-11, Cleveland 1, Ohio
Please send copy of "Typical Results of TOCCO Induction Heating for Forging."

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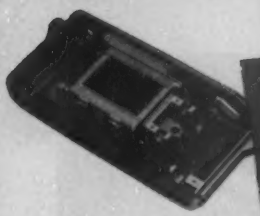
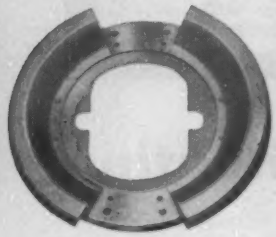
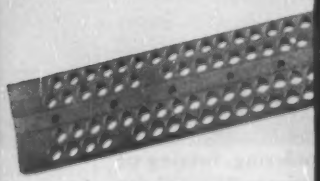


*In Plastics*

*In Aluminum*



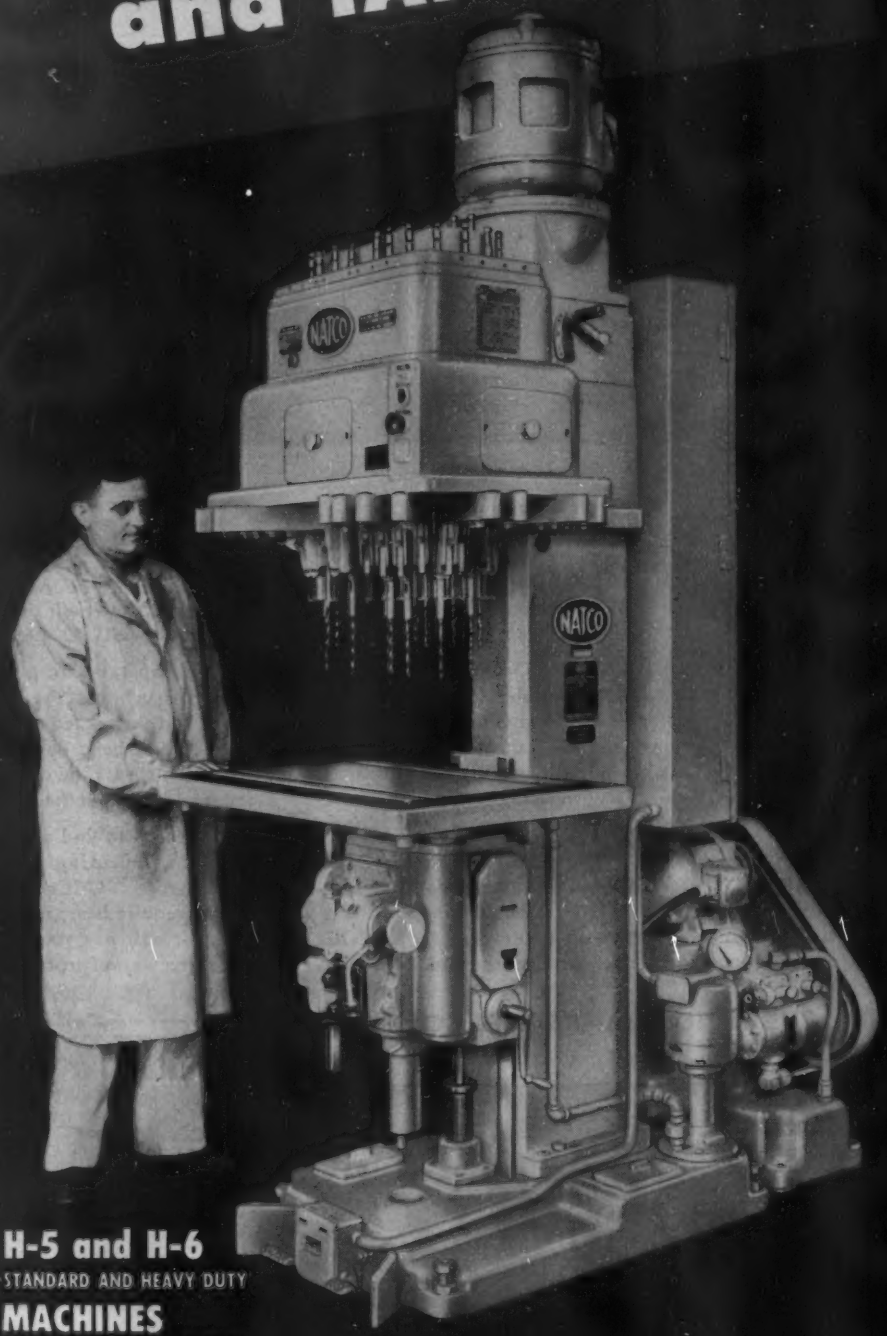
*In Cast Iron*



*In Wood*

*In Steel*

# NATCO
## HIGH SPEED, SENSITIVE
# MULTI-DRILLERS and TAPPERS

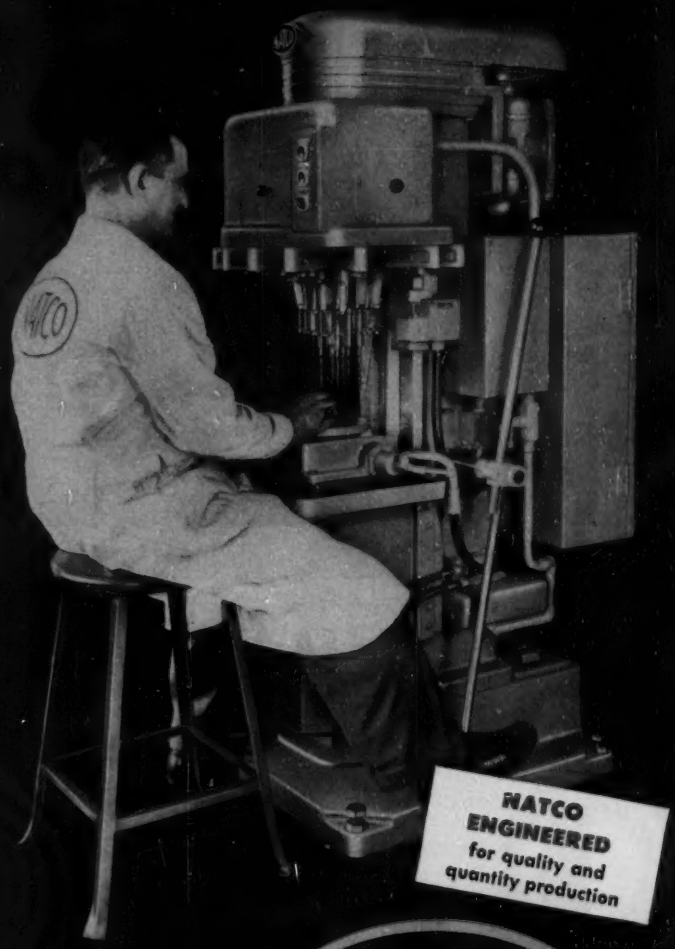



**H-5 and H-6**
STANDARD AND HEAVY DUTY
**MACHINES**
*(H-6 Machine Illustrated)*

# ...REDUCE COSTS WITH INCREASED PRODUCTION OF SMALL PARTS!

The NATCO Model B-33 light, sensitive multi-drilling and tapping machine shown at right is available in three feed arrangements: hand and foot feed or combination hand and foot and air-oil feed; and air feed. These machines have adjustable spindle arrangement for different work set-ups and a large working table. They offer maximum production on light work where super-sensitive operations and high speed are important.

NATCO H-5 and H-6 high speed sensitive multi-drillers and tappers are furnished in standard and heavy-duty models with adjustable multi-spindle, fixed center spindle or slip spindle type heads. They are provided with change gears and quick change speed mechanism for correct spindle speeds. They will efficiently handle a wide range of small and medium-sized work and make possible multiple drilling or tapping of small holes at minimum cost.




**B-33**
LIGHT, SENSITIVE
**MACHINE**

**NATCO ENGINEERED** for quality and quantity production

*Call a Natco Field Engineer*

*to help you solve your problems in Drilling, Boring, Facing and Tapping*

NATCO

**NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana**

*Branch Offices*

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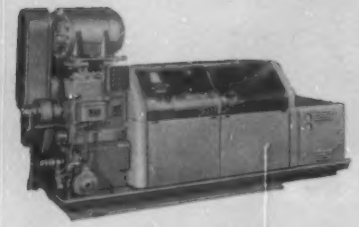


## A 3-WAY MARKETING SERVICE FOR USERS OF MACHINE TOOLS

Jones & Lamson now offers a choice of ways whereby you can acquire new machine tools . . . on terms best suited to your own needs. In addition to outright purchase, with its obvious advantages, we offer a "Pay-from-Productivity" plan, on a 1-to-5 year basis, at interest rates as low as 3¼%*. This plan is designed for companies that prefer to finance modern machine tools out of the actual additional earnings these tools produce. Also, a lease plan — in 4 optional forms — for companies that lack the full cash purchase price, or have more pressing uses for their capital.

*(add-on rate)

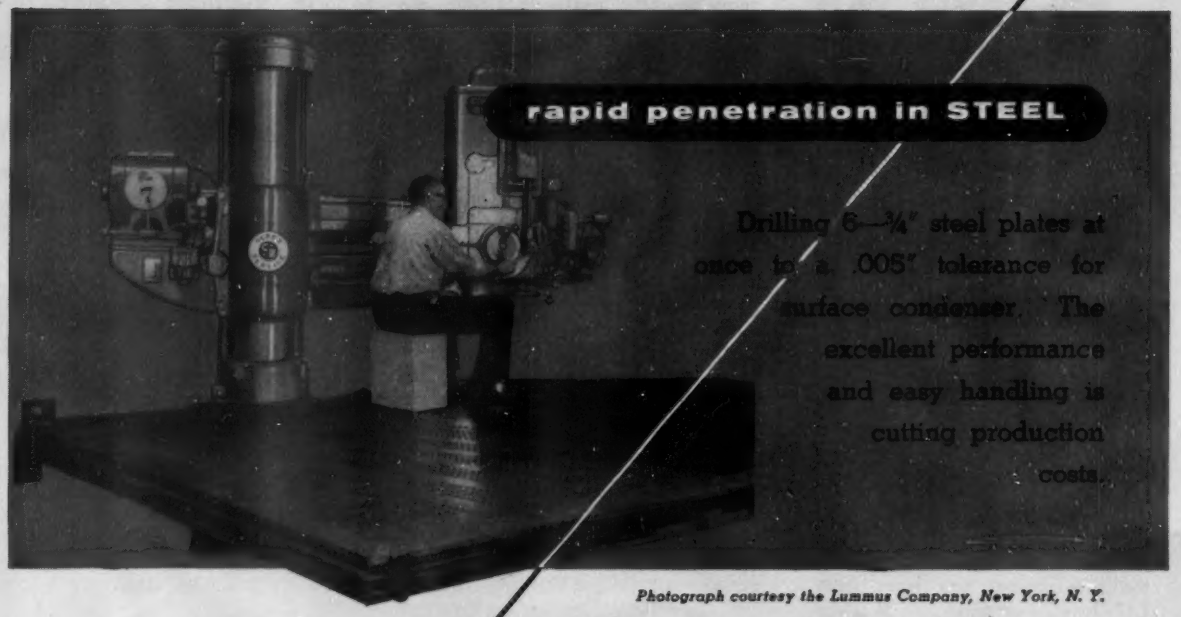
**JONES & LAMSON MACHINE CO.**
502 Clinton St., Springfield, Vermont, U.S.A.

UNIVERSAL TURRET LATHES • FAY AUTOMATIC LATHES • AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES
AUTOMATIC THREAD & FORM GRINDERS • OPTICAL COMPARATORS • AUTOMATIC OPENING THREADING DIES & CHASERS

# rapid drilling with ACCURACY saves money

**at THE LUMMUS COMPANY**

On jobs like these the ease of control, the accuracy and the outstanding speed of penetration of Cincinnati Bickford Radial Drills pay big dividends.



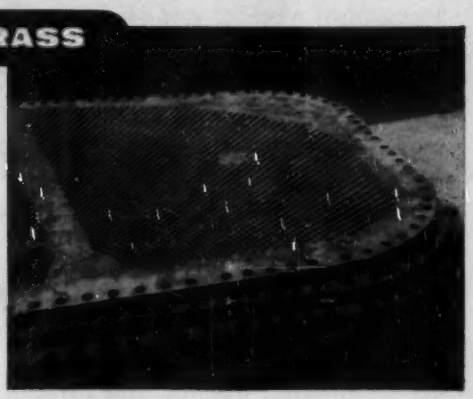
**rapid penetration in STEEL**

Drilling 6—¾″ steel plates at once to a .005″ tolerance for surface condenser. The excellent performance and easy handling is cutting production costs.

*Photograph courtesy the Lummus Company, New York, N. Y.*

**rapid penetration in BRASS**

Drilling 4 brass tube sheets, 1½″ thick, simultaneously to a .002″ tolerance, a special spiral brass drill penetrates at the rate of 10″ per minute.



Of interest to every user of Drilling Machines—Write for your copy of 80-year Anniversary Booklet.

**CINCINNATI BICKFORD**

**RADIAL AND UPRIGHT DRILLING MACHINES**

**THE CINCINNATI BICKFORD TOOL CO.**

**Cincinnati 9, Ohio, U.S.A.**

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**Q**uality
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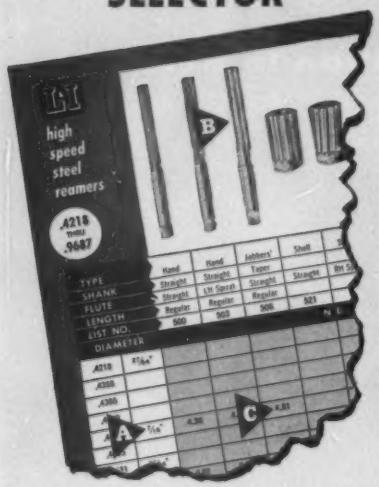
is easy as **A B C**
with the exclusive new

**COMPARATIVE NET PRICE SELECTOR**

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1

# Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

## Too Many Horses

Chrysler people, defending the horsepower race, point out that, "The more powerful engine cuts down the time spent on the wrong side of the road, giving an added measure of safety to drivers who get out of line at the wrong time."

Such reasoning seems to me like so much rot or rubbish, considering:

1) With the increased horsepower, the car on the right side of the road —the car being overtaken—has also a higher speed, and the ratio of one car to the other will again be the same. There can be no question of "increased safety."

2) Increased horsepower makes people more reckless and more eager to overtake. In other words, they are more liable to misjudge the margin left for overtaking. I don't mind, as long as they insist on endangering their own lives, or if they would find a way of endangering those people responsible for pushing the horsepower race. The trouble is, they endanger the lives of the decent and responsible people, too.

I don't blame Chrysler more than the rest of them for this race. They're all equally responsible. Credit goes to Chrysler for being—so far—very conservative and reticent about making their cars look like checkerboards, and about introducing those silly frills, protrusions, rat tails, and so forth, to be found on some other cars.

H Landauer
*Tampa, Fla*

## Patented Idea

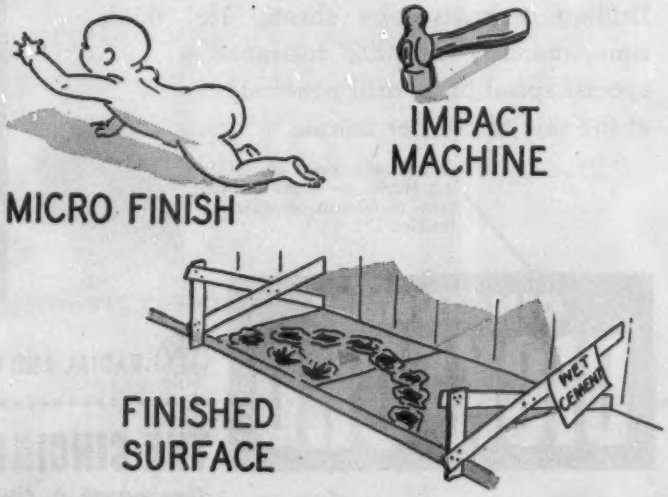
The Practical Idea for a slotted aluminum step-chuck (*AM*—Aug 30, '54, p115) causes us some concern.

We hold title to US Patent No. 2,494,899 which covers the principles embodied in this Practical Idea. We are pleased that *AM* and Mr. Ramm consider this principle to be practical, but we do not enjoy the fact that you are encouraging your readers to infringe on our product.

The enclosed photograph shows that we go much farther in application than the suggestion in Practical Ideas and, as our slant is to sell the Ross "Master" internal collet as a production tool, it is made of hardened and ground tool steel.

*By D G SMITH*

## GRINETICS

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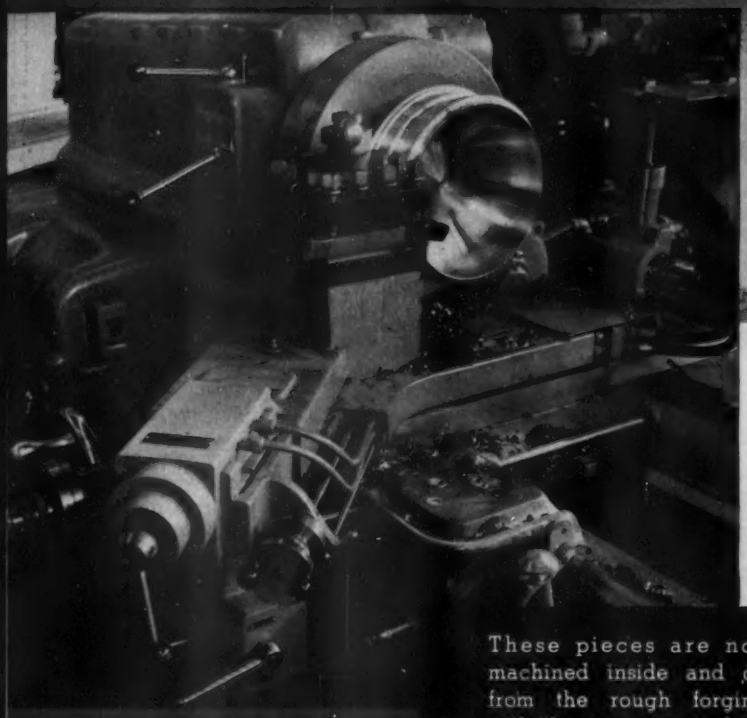
Rheem solves a "toughie"

and increases production

# three hundred per cent



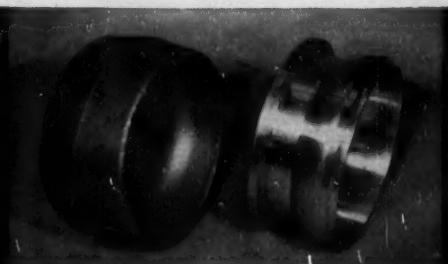
Machining the various contours of these guided missile components with the accuracy and finish required was a problem that Rheem Mfg. Co., Aircraft Division at Downey, California, had to lick.

The answer . . .

## "AMERICAN"

## HYDRAULIC DUPLICATING LATHES

These pieces are now machined inside and out from the rough forging, with the accuracy and degree of finish demanded, in 68 minutes floor to floor —removing 23 pounds of metal from each piece.



The simplicity and dependability of the duplicating equipment plus the power and sturdiness of the "AMERICAN" Lathe proved just the right combination for this difficult job.

We specialize in "tough ones" —better ask us about your "problem" jobs.

**THE AMERICAN TOOL WORKS CO.** Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

LEADERS IN INDUSTRY MARK WITH NOBLEWEST

# ROLL-O-MARK

**MULTI-PURPOSE ALL-PNEUMATIC MARKING MACHINE**

1 *Roll-Marking into Surface of Piston*
2 *Serial Numbering into Metal Shaft*
3 *Permanent Marking and Graduating into Metal Collar*

*Model 50P1*

This multi-purpose Roll-O-Mark can be set up faster . . . tooled up easier . . . accommodates attachments more readily than any other marking machine. With all-pneumatic operation, no motor or separate power unit is required. Simply connect to the shop's air line—air is used *only* when in operation. This multi-purpose metal marking machine offers many other advantages such as — 5" die slide stroke . . . open throat design . . . hand wheel for rapid table elevation . . . independent control for set up.

Whatever your needs for metal marking, Noblewest makes the machines, marking dies, and work-holding fixtures for doing the complete job faster, better, at lower cost. And remember. Noblewest Roll-Marking is permanent marking—*good for the life of your product.* There is a Noblewest Representative near you. Write Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford 8, Conn.

**ADDITIONAL EQUIPMENT AVAILABLE WITH MODEL 50P1**

*• Automatic Air Ejection • Dial Feed Table —Air-Operated • Automatic Indexing Attachment—to numbering head for consecutive serial numbering • Automatic Cycling*

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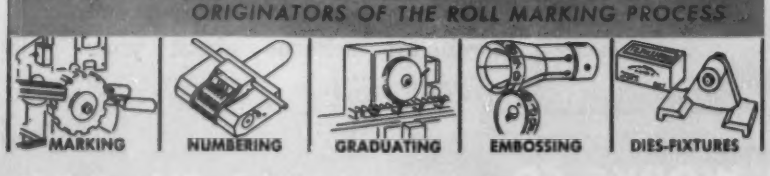
MARK IT BEST WITH
NOBLEWEST IMPROVED MARKING DEVICES
NOBLEWEST
ORIGINATORS OF THE ROLL MARKING PROCESS



We acquired the patent from Mr. Ross in Jan 1954 and have spent most of the subsequent time getting our tooling set and checked out. We have been selling the collets locally, but have avoided large-scale national advertising until we could satisfy the demand on a national basis. We are presently engaged in attempting to obtain connections with tool representatives in the East and Midwest, so our forthcoming advertising campaign will find our distribution system ready to function; we are able to supply collets on demand at the present time.

John R Morris,
*President, Morris & Batchelor Inc.*
*Glendale, Calif.*

*We are surprised to hear that Mr Ramm's idea is patented, because it has been used in shops for a great many years, particularly in the four-jaw version which can be produced with a hacksaw, rather than in Mr Ramm's design. The question in our minds here was actually whether or not to publish the item because we felt it might be familiar to a great number of our readers.*

*Obviously, there was no effort either on Mr. Ramm's part or our own to infringe a patent, and Mr. Ramm's item is certainly nowhere nearly as refined a device as yours. Our guess is that his gadget would be used only in small shops where a momentary need existed, while for any production problem justifying the purchase of holding equipment, a device such as yours would be purchased outside.*—Ed.

## Diamonds—Russian Style

I read with great interest your article on Russian cutting tools (*AM*—April 12 '54, p170) and would like to mention that, with regard to shaped diamond tools, similar tool shapes have been in use for a considerable time. More than 25 years ago, it became general knowledge that the side cutting angle should be selected

as small as possible, and some manufacturers quoted figures of 1 to 2° (Fig. 1). The idea was that this edge should cut away the residue and also exert a burnishing effect when the compressed material on the surface recovered. At this time it could not be suggested to have this angle reduced to zero, as the dynamic properties of the machine, i.e. vibrations, would destroy the cutting edge.

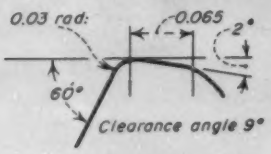



Fig. 1

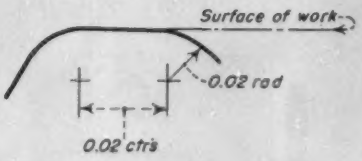



Fig. 2

During the war, F C Jearum, in England, developed the so-called blended-facet tool (Fig. 2) which consisted of a straight edge radiused to both sides. With this tool extremely good surfaces can be produced. The straight part of the edge has the properties that feed ridges are practically eliminated, and the length of this edge is several times that of the feed per rev. Theoretically, with such a tool, no residue on the surface is produced. Surface roughness can be reduced to below 1 mu in.

P Grodzinski
*Diamond Research Dep't,*
*Industrial Distributors (Sales) Ltd*
*England*

## Render Unto Ceasar

Your article on the turret-lathe boring tool (*AM*—Aug 2 '54, p155) was a factual report on the tools used in a demonstration at our plant. However, we feel that credit should properly be given to F J Wilson, plant superintendent, Sealol Corp, Keene, NH. The original concept of this type of tool was his, and it was he who brought it to our attention. We, in turn, ran some demonstrations and also designed other types of the tool. In fairness to Mr Wilson and to the Sealol Corp, we trust you will make it clear to your readers that there was no desire on our part to steal their thunder.

N C Richardson
*Ass't Adv Mgr*
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Twist drills machine-ground the Oliver Way not only last up to 3 times longer than hand-ground drills but also cut faster and more accurately.

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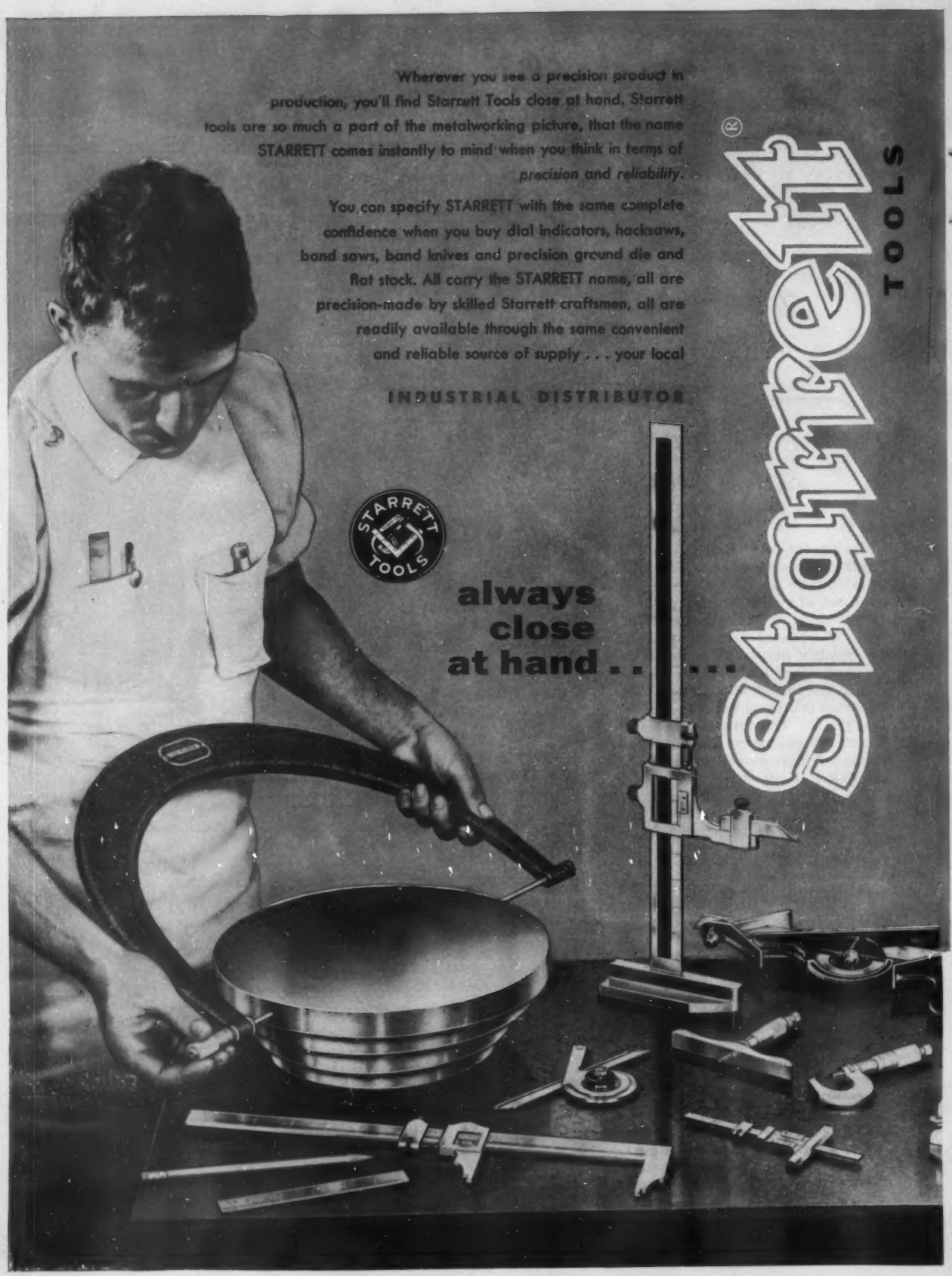
Wherever you see a precision product in production, you'll find Starrett Tools close at hand. Starrett tools are so much a part of the metalworking picture, that the name STARRETT comes instantly to mind when you think in terms of *precision* and *reliability*.
You can specify STARRETT with the same complete confidence when you buy dial indicators, hacksaws, band saws, band knives and precision ground die and flat stock. All carry the STARRETT name, all are precision-made by skilled Starrett craftsmen, all are readily available through the same convenient and reliable source of supply . . . your local
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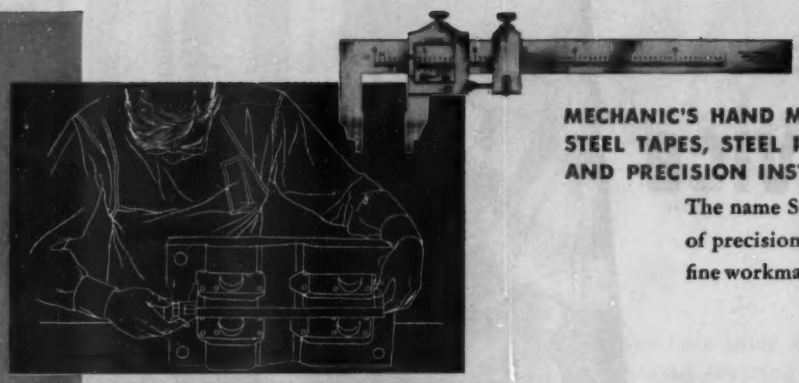

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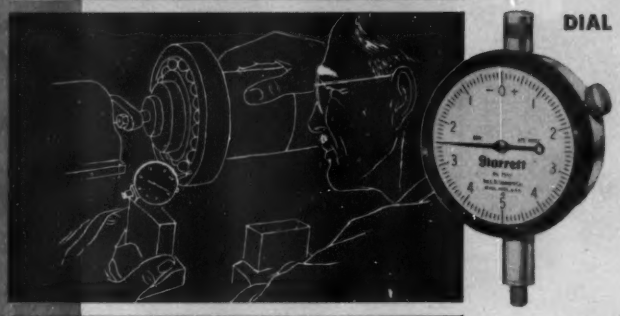
**STEEL TAPES, STEEL RULES**
**AND PRECISION INSTRUMENTS**

The name Starrett on tools is the hallmark of precision — a guarantee of accuracy, fine workmanship and complete dependability.

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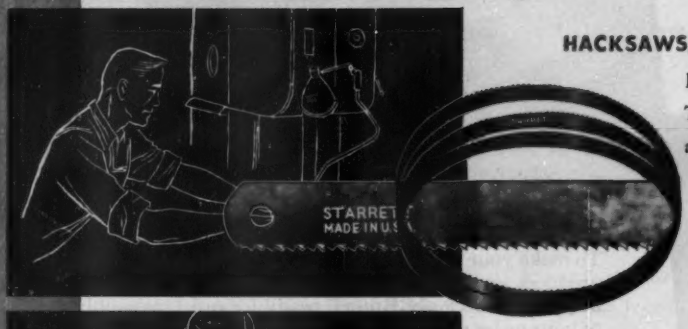
Standard for quality and precision — a complete line for every gaging or production inspection application.



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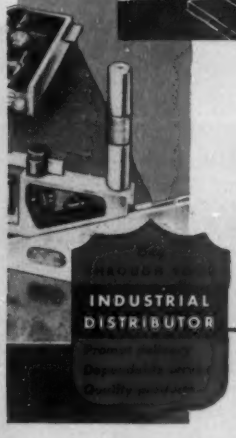


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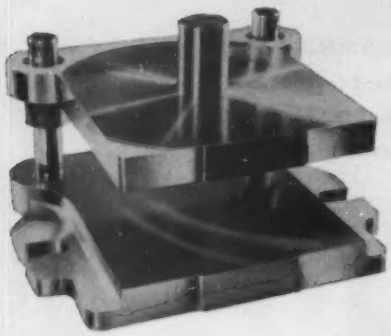
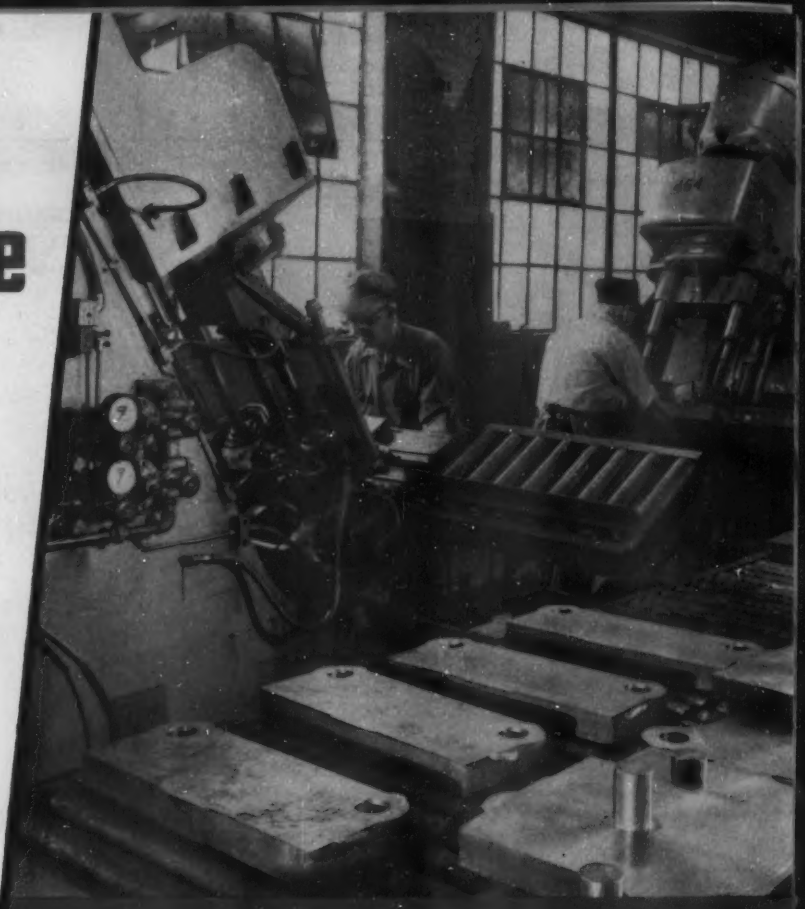


*. . . made possible by Danly's unique mass-production and distribution system.*



*At the main Danly plant . . . high speed precision drilling. Interchangeable fixtures accommodate the full range of standard die set sizes.*

**At your Danly Branch plant . . . shipping die sets to your order. Up-to-date procedures and facilities assure fastest delivery.**

**To make your tooling program move faster, Danly mass produces interchangeable, precision die set parts . . . stocks them at your local Danly Branch ready for quick assembly to your order and delivery to you. With Danly, from the time you place your order until the set is delivered to you is a matter of only a few days. This extra fast delivery starts at the main Danly plant in Chicago where two complete high-speed production lines turn out a wide variety of precision die set parts. Held in ample stock by your local Danly Branch, these interchangeable parts are assembled to your order and delivered immediately. Don't let lagging die set delivery bog down *your* tooling program. Order from your Danly Branch and get the fastest service . . . ever.**

*Fast, nationwide delivery from these branch plants*

DANLY

**DANLY MACHINE SPECIALTIES, INC.**
2100 South Laramie Avenue
Chicago 50, Illinois

# Spot News of Metalworking...

- **ELECTRICITY-EATIN' AUTOMATION . . .**
  Chevrolet estimates its new high-production plants are using double the electricity that its plants used in 1950. This year's installed electrical horsepower per worker is 15, in 1950 it was 7.4.

- **ALUMINUM-STEEL ANTI-CORROSION CLAD . . .**
  Low alloy steels can replace high alloy steels in some jet aircraft, marine boiler and diesel exhaust applications if clad with aluminum in a new GM-developed bonding process, Alumicoat, now available commercially for the first time through Arthur Tickle Engineering Works, Brooklyn, NY, sole licensee of the process.

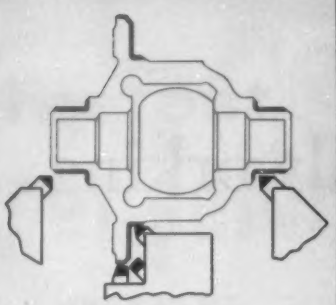
- **AF AND THE SMALL PRIME . . .**
  Air Force cites these figures to refute claims it is squeezing out the small shop in the placement of contracts: since Korea, small prime contractors (500 employees or less) have been awarded 9.8% of all AF contracts — in WWII they got only 4.5%, in Korea 6.2%. In the period July 1953-June 1954 small shops received 76% of the contracts they were capable of handling. Prior fiscal year it was 73%. Year before that: 55%.

- **NAVY CHROME . . .**
  Navy claims it has saved $15 million since it started chrome plating aircraft engine cylinder walls — extending cylinder life from 1200 to more than 3000 hrs, reducing cylinder wear, oil consumption and carbon accumulation by 50%.

- **RUSSIAN MACHINE-TOOL STANDARDS . . .**
  Russia's machine-tool industry is back in its often-occupied position in the Soviet doghouse, this time over standardization. The government has spent some $100 million in preparing specification manuals for fasteners and attachments and machining practices — two-thirds of Russian machine tool plants ignore them, preferring to make their own rules as they go along.

- **MILITARY TOOLING . . .**
  Defense Dept's spending for production equipment and tooling will drop sharply this year to around $615 million — compared with $1.1 billion in fiscal 1954, and a record $1.7 billion in 1953. Reason: end of Facilities Expansion Program.

- **METALWORKING AND THE CHICAGO FLOOD . . .**
  Recent flooding of auxiliary equipment (no generators, turbines, etc) in the basement of two Chicago power stations put 17 major metalworking firms on a 50% operating basis for two weeks — and this was possible only because 250 smaller firms went on 50% output, too, so that the big plants could operate.



Heavy lines show the surfaces machined.

Style 112-C Ex-Cell-O Precision Boring Machine with double set-up.

Close-up of the two differential cases, in work position. This precision work is done with hydraulic feeds and easily-controlled automatic cycles.

# Insure your Profits...

## with DOUBLED PRODUCTION on Ex-Cell-O STANDARD MACHINES

XLO
EX-CELL-O for PRECISION

**A NEW APPROACH . . .** Turn four diameters—face three shoulders—chamfer one edge. Not one at a time—but *Two!* Not on a double end—but on a single end Ex-Cell-O Precision Boring Machine!

Workpieces are automotive differential cases—precision work—limits of plus or minus .0005" on diameters.

See how Precision Boring Machines can save time and money for you. Call your local Ex-Cell-O representative, or phone or write Ex-Cell-O for a Precision Boring Catalog.

54-21

**EX-CELL-O**
**CORPORATION**
DETROIT 32, MICHIGAN

MANUFACTURERS of PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

# Washington . . .

**Federal mediators** are preparing for annual wage negotiations in the auto industry next spring. The idea is to train a three-man team of mediators on the intricacies of the UAW proposals which will be taken up in negotiations in March.

**The Mediation Service is taking care** that it doesn't get burned as it did in a similar situation five years ago. That was in the 1949 pension fight between the steel industry and the CIO Steelworkers. Mediators weren't prepared then and had to play by ear when they moved in.

**If the plan works out,** two mediators from Detroit and another from Washington will check out with both the UAW and the auto companies to see how each side prepares for the bargaining table.

• • •

**A modern version of the DC-3 is in the works.** The big problem is to build a jet or turboprop air transport for 25 to 35 passengers with a price tag of less than $500,000 suitable for the airlines, particularly the short-haul operators. Today a Convair in the 40-50 passenger class costs upwards of $750,000.

**Fact is that there are probably more DC-3s in use** on airlines and by the military than any other type of transport. But wear-and-tear are beginning to catch up with these planes. Big problem for the planemakers is to get the government to pick up the development cost. Air Force and Navy are leaning toward sponsoring such a plane, that is, paying for most of the development costs.

• • •

**First contracts** under the Pentagon's long-drawn-out $100-million Reserve Tool Program may be awarded some time next month. This was officially hinted by Defense Mobilization Director Arthur Flemming in a recent New York speech. But at press time, the "official final go-ahead was still lacking," according to one high-level bureaucrat.

**The funds have already been allocated** among the three services, the Air Force getting the lion's share. Types of tools to be procured have also been selected. These include stretch-forming presses, boring machines, slab-type planers, gear hobbers, and other equipment. Tools to be bought are officially described this way: "long-lead-time tools, verstatile and flexible enough to be used in present and future programs, and which are general-purpose equipment as applied to the particular type of production envisaged."

**But there are still some details to be ironed out,** and these are what have been holding up the works lately. One, for example, is the question of whether tools should be installed in active contractors' plants or new "shadow" plants, stored in government depots, or maintained in tool builders' plants. Details on actual procurement procedure—whether by negotiated sales or general bidding—are also vague. But one official does say that purchase of the Vance Plan tools will be "quite different" than normal military tool procurement. Implication is that the services will be a lot closer this time to actual tool purchases.

• • •

**In his same speech, Flemming said ODM** "expects to launch a $40-million program for the construction of elephant tools." But Washington insiders pooh-pooh the idea that the program is anywhere near getting under way. The program would be financed under the Defense Production Act's $2.1-billion borrowing authority. Pursestrings on this money are held by a tight-fisted review board, which won't allocate any funds until a completely detailed proposal is submitted.

• • •

**BDSA's Metalworking Equipment Division** is supposed to work up such a plan for ODM in cooperation with Defense Dept, GSA, and SBA. But so far, only the ground work has been done. The $40 million figure used by Flemming is only a rough estimate that BDSA has come up with as a reference point. The agency is now investigating elephant tool capacity of regular producers, of firms who make both elephant tools and other big products like engines and turbines, and of firms with big general-purpose plants producing only ships, heavy vehicles, giant electrical equipment, and the like, that could be switched to output of mammoth machine tools in an emergency.

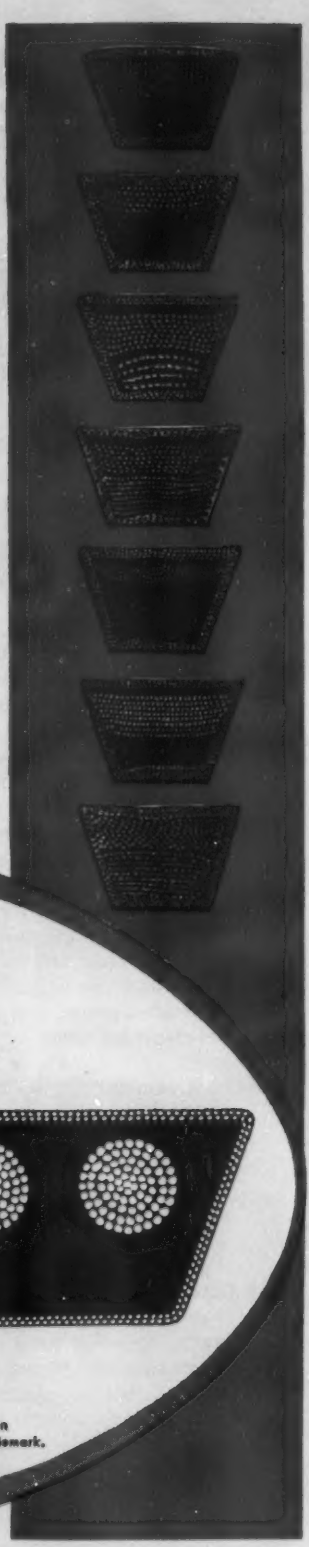
**Based on projections of elephant requirements,** BDSA will determine whether there are deficiencies in productive capacity, and if yes, where and what kind they are. Idea is then to build up additional capacity or to stockpile the tools. Indications are that the latter course will be followed.

• • •

**Government officials are surprised** at the latest civilian tool lease deal on military-owned equipment now pending at Tung-Sol Electric, Inc. The firm is willing to pay rent over a fixed period that would equal the equipment's initial value.

**ODM still emphasizes that probable approval** of this deal and earlier approvals are not supposed to indicate any precedent on civilian tool leasing policy, that the general ban on such deals still stands, but that exceptional cases will be judged individually on their "own merits as related to the government's best interests."

# There is a difference in V-Belts— and it's Big Enough to Save You Money!



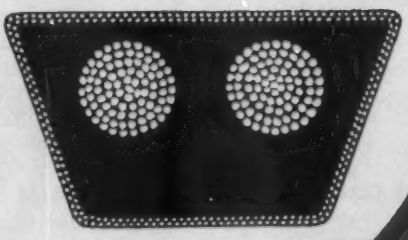
**TEXROPE**
V-belt
**DRIVES**

**The secret** lies in the way a belt is built. *Texrope* V-belts, with grommet construction, are completely different from seven leading competitive brands. Tests revealed some astonishing facts.

For instance, a *Texrope* grommet belt, C section, had almost 50% greater strength than the best of the other comparable belts . . . almost twice as much strength as the poorest.

Ask your A-C representative or distributor for the complete story. Have him show you what the difference in V-belts means in terms of dollars you can save.

A-4456



Texrope is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

**ALLIS-CHALMERS**

Milwaukee 1, Wisconsin

**Buick and Oldsmobile** apparently are going to have the four-door hardtop field all to themselves for a year (*AM*, Oct 11 '54, p117).

**The stylish new bodies,** which probably will go on display first at General Motors' Motorama in January, may provide the sales punch both divisions will welcome to help them retain the high sales standings they won this year.

**Plymouth, squeezed out of its perennial third-place berth,** proposes to make a determined run to knock Buick out of that slot. J P Mansfield, Plymouth president, is planning to sell about 740,000 new Plymouths.

**Ivan Wiles, Buick's general manager,** is confident his division can hold third. He has hopes that Buick will break its own sales record, set in 1950 when the division moved about 556,000 units.

• • •

**Bulk of the 1955 models** will have been on sale for two months or more when the Olds and Buick four-door hardtops appear. The public will have had plenty of opportunity to view all new cars. Any customer who is having trouble deciding which make he wants will, you can be sure, take a long look at these two late starters.

**The new body style** will appear on those cars which use Fisher Body's basic "B" body shell — the Buick Century and Special and the Olds 88 and Super 88. No other auto company has indicated it will produce a comparable body style in 1955.

**No structural details are yet available,** and it is not known how engineers have managed to retain the rigidity and strength required of a body.

**The rear doors trail so deeply** into the rear fender that the door handles are almost directly under the rear window molding. The center post, on which the rear doors hinge, ends at the belt line; front and rear side windows interlock, much like the windows on two-door hardtops.

**Initial impression:** removal of the "B" post gives the passenger compartment the appearance of being much larger than it actually is.

• • •

**Adoption of "power packages" by many auto makers** this year may help to determine whether the car-buying public actually desires more horsepower than that presently offered.

**Power packages,** which generally consists principally of a four-barrel carburetor, dual-exhaust system, and a special air cleaner and manifold, have previously been available at extra cost on some cars, of course, but they will show up all over the industry in 1955 models.

**The package is designed to add 10, 20 or more horsepower** to a standard engine. Cost of the package is in the area of $100. (Dodge in 1954 offered the option for about $87.) If sales of the units run high in '55, Automakers likely will interpret that as an indication that motorists are not yet satisfied with horsepower levels. If sales lag, the horsepower race may slow down.

• • •

**That gleam that showed up in the eyes** of many a motorist when Ford announced that the base price of its sporty Thunderbird is $2695, FOB Detroit, may dim a bit when would-be buyers learn how expensive the frosting is.

**Delivered in Detroit,** here's how the price of the sexy little auto can soar: taxes, license, freight and dealer make-ready charges bring it up to about $3042. Add automatic transmission: $221.90 (Ford makes its automatic transmission for about $115 and retails it on the regular passenger car line for $185 plus tax. When used on the Thunderbird, however, a special linkage is required, which accounts for the price differential.)

**Power steering, power brakes and power window lifts** add about $247. Radio and heater: about $189. If the buyer wants both the standard plastic hardtop and the optional convertible top, the cost is almost $300.

**Beyond those items, there are a dozen other options.** A completely "loaded" model lists in Detroit for nearly $4200, although a buyer possessed of Spartan characteristics and willing to do without all the little niceties could get delivery for about a thousand dollars less than that.

**Even so,** Ford's price forced Chevrolet to lop nearly $700 off the Corvette price. At the end of October, Ford was building 40 Thunderbirds a day.

• • •

**General Motors will build its 50-millionth** car in the US on November 23, and will celebrate the occasion by holding public open house at all of its 114 plants in the nation.

**GM reports these facts on its defense production:** Capacity for manufacture of metal products is about 10% of the country's capacity, but defense production assigned to GM during the "present emergency" has represented "considerably less than 10%."

**Since the beginning of this program,** total orders for defense products awarded to GM have amounted to $6.9 billion. Of this amount, orders totaling $5.8 billion were awarded between July 1, 1950, and January 1, 1953. Net new orders between that date and September 30, 1954, totaled $1.1 billion.

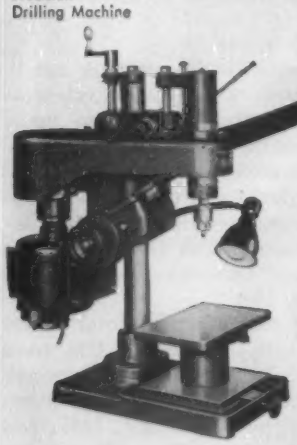
**Net sales of all GM products** in the first nine months of this year totaled $7.2 billion, 9% less than the record volume established in the first nine months last year.

5408

# precision product?

## EXACT HOLES ARE IMPERATIVE!

HAMILTON VARIMATIC®
Super Sensitive
Variable Speed
Small Hole
Precision
Drilling Machine



Are you fighting the never-ending battle of trying to produce exact holes on a drilling machine which, itself, is not built to precision tolerances? You are under no necessity to do so. For the difference in price between the cheapest bench type, small hole drilling machine and the Hamilton Varimatic is reckoned in pennies per day. And the Hamilton Varimatic (holes from .004" to 5/16" in all drillable materials) is *super sensitive*. Provides speeds, *infinitely variable*, between 840 R.P.M. and 9300 R.P.M. Is built to *precision tolerances*, and with the stamina to *retain* precision.

**Get prices and specifications without obligation**

**ASK FOR FREE BULLETIN 5408**

Address The Hamilton Tool Company
830 South Ninth Street
Hamilton, Ohio

IT'S A **Hamilton Tool**

USE IT WITH CONFIDENCE

# Machine Tools . . .

**Machine tool orders have turned up sharply.** From a low of 124.7 in July, as measured by the NMTBA Index, they have risen to 179.8 in September. And there is reason to believe they went even higher in October.

**The September figure represented a gain** of almost 32 points over August. It was the third best month in the past year, and came close to the year's peak of 185.2 in June.

**Just so that no one gets a false impression** from this recital, however, it is well to point out that today's machine tool sales nowhere near match those of 1952 and the first nine months of 1953.

**There is business to be had, nevertheless,** and the aggressive builders are getting it.

• • •

**Sentiment among distributors** gathered in Cincinnati for the annual meeting of the American Machine Tool Distributors' Assn was very good.

**Everyone expressed the opinion** that tough selling days are ahead, but not a single distributor felt that the bottom was dropping out of the market. (See p 176.)

• • •

**Tung-Sol Electric Inc of Washington, NJ,** wants to lease a "package" of 48 machine tools, valued at $77,000, from the Army to make miniature electronic tubes for civilian customers.

**It proposes to pay a rental of 20% a year** for five years, compared with the government's normal charge of 12%. Thus the Army would get back in five years what it paid for the machines in the beginning.

**Pentagon has given its blessing to the proposal** on the basis of the liberal revenue that the Army will get.

**The desired machine tools are now installed** in Tung-Sol's plant, but military products are no longer being made there.

**The Tung-Sol case** has not yet come to BDSA's Metalworking Equipment Division for review.

• • •

**Believe it or not, some of the Vance Plan money** is really going to be spent.

**Ralph E Cross, BDSA assistant administrator,** revealed this fact at the distributors' meeting in Cincinnati. The defense budget for this year contains $100 million for this purpose.

**At least half of that amount** will be converted into machine tool orders within six months.

• • •

**What Mr Cross did not mention** is the fact known only to a few that the main delay in placing orders is the difficulty the Air Force is having in finding a contracting authority within its own organization to take on the job.

**This condition,** which seems strange at first glance, is understandable. The government just now does not want to have big machine tools built and installed in contractors' plants.

**The Air Force, on the other hand, is not keen about** warehousing the new machines as standby reserves in centrally-located spots.

**Just what the solution will be is not clear.** One strong possibility is that machine tool builders producing these elephant tools will be asked to become custodians of them in warehouses erected at government expense close to builders' plants.

• • •

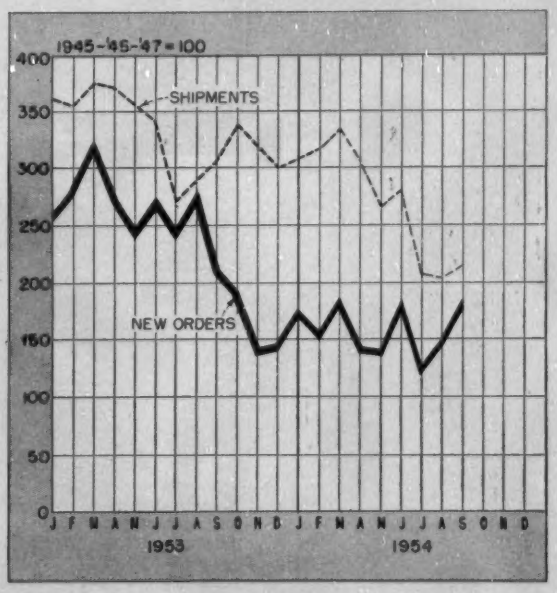
**The so-called elephant tool program** is making progress, Mr Cross said. BDSA's Metalworking Equipment Division is studying justification for additional capacity to build elephant tools and additional capacity for key general-purpose machine shops for defense-supporting products. Steam engines, rolling mills, large industrial pumps and valves, and heavy presses are included in these products.

**BDSA's studies should be completed** and recommendations made to the Office of Defense Mobilization within 30-60 days.

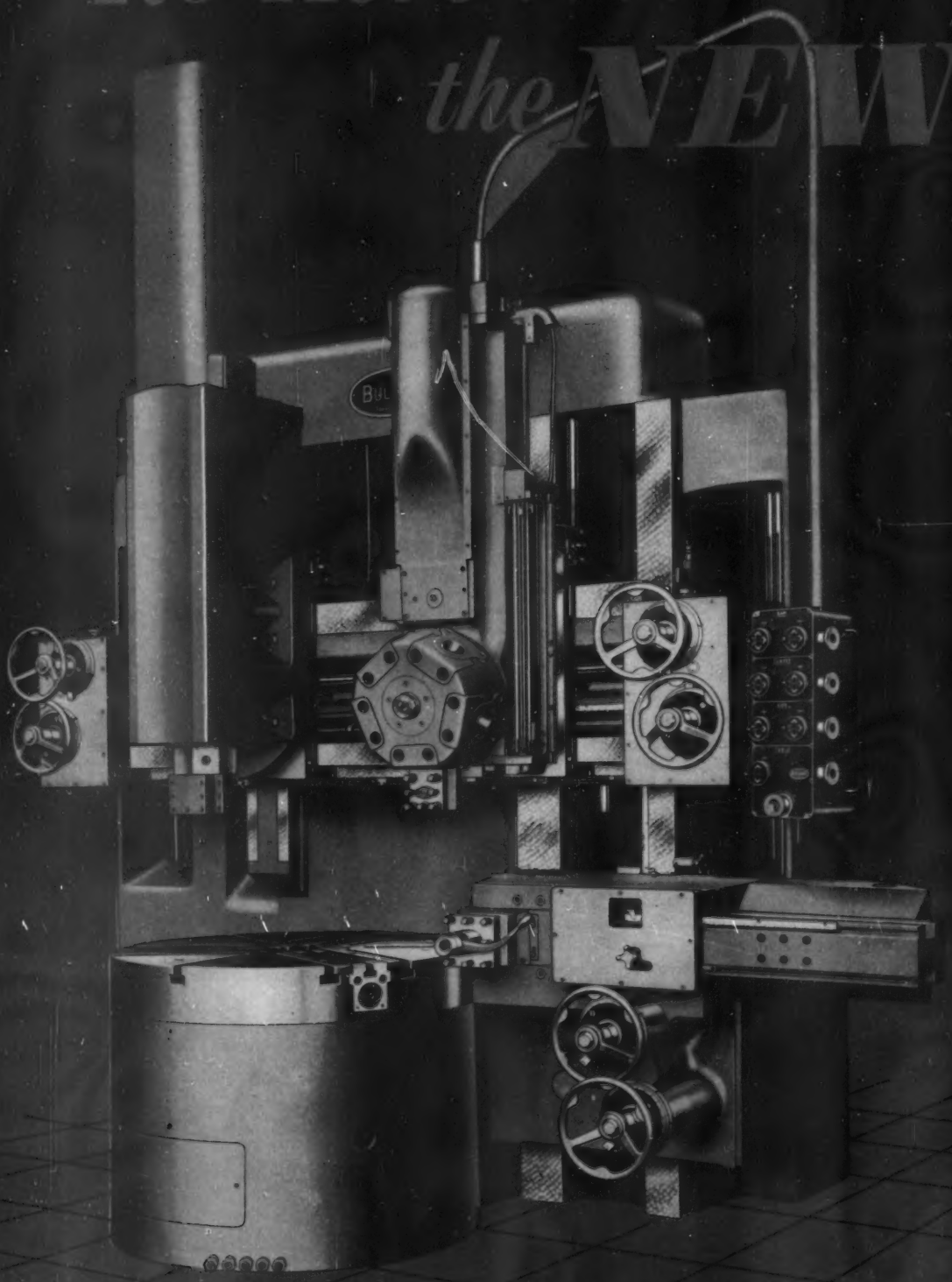
**Just what will happen then will depend upon** the Borrowing Authority Review Board.

**MACHINE TOOL INDEX**
**(1945-47 = 100)**

(Source, National Machine Tool Builders' Assn.)



# *It's Here . . . . the NEW . . .*



# CUT MASTER *Model 75*

## A COMPLETELY NEW DESIGN OF VERTICAL TURRET LATHE

This new line has been engineered and designed to take full advantage of the latest improvements in cutting tools, methods and materials. Here are some of its features:

★ **PENDANT CONTROL,** exclusive Bullard design, for maximum machine control from a movable pendant station. Start and stop spindle; selection of speeds, feeds and directional movement of all heads in feed or traverse are quickly and easily accomplished from the Pendant. Interlocks and a stop-all stick provide safety for both operator and machine.

★ **ELECTRIC CONTROL PANEL** – Accessible yet concealed and protected from oil, dust and other foreign matter.

★ **IMPROVED CUTTING COOLANT SYSTEM** – Adjustable conductors with flexible hoses for channeling coolant directly to cutting tools and adjustable heavy gauge steel guards designed for easy chip removal.

★ **POWER INDEXED MAIN TURRET**–(Optional)

Available in 26, 36, 46, 56, 66 and 76 inch sizes for shipment to you early in 1955.

**For the complete story use this coupon for your copy of the new catalog.**

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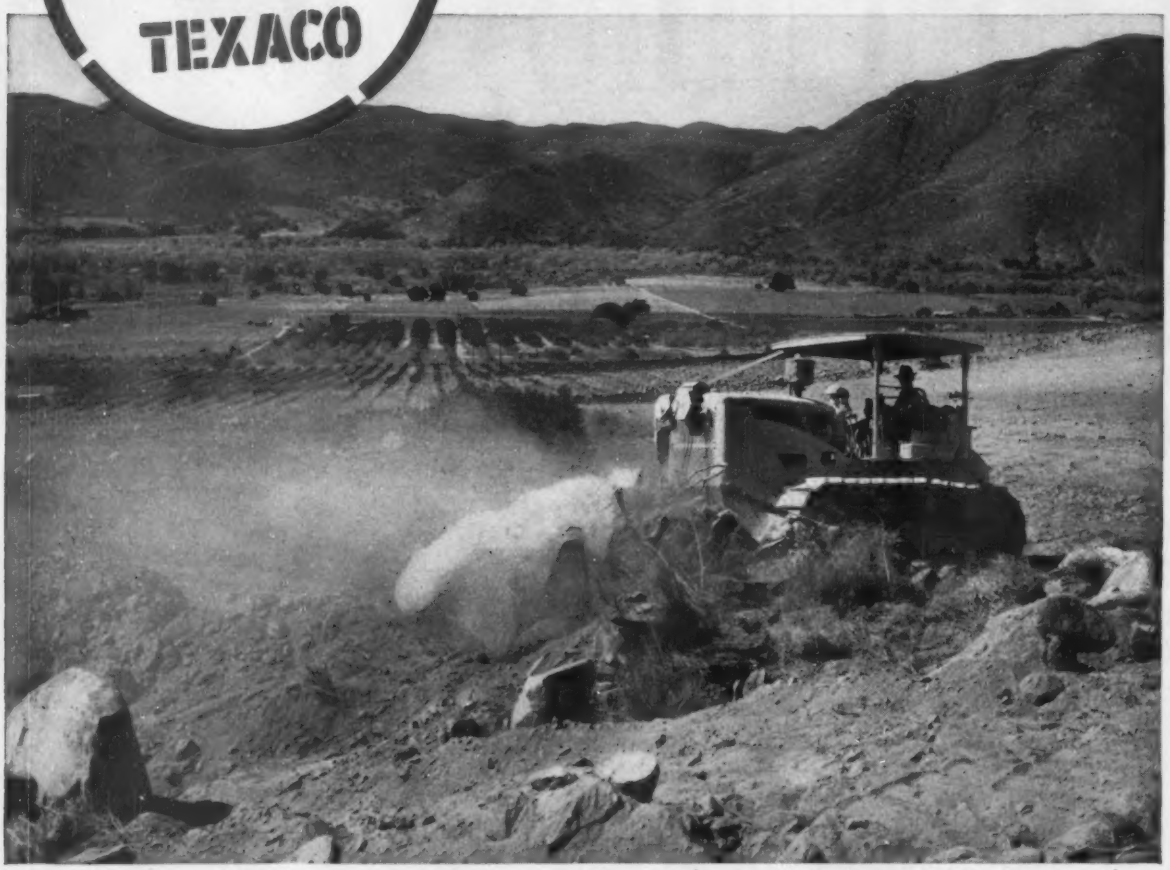
# THE TOUGH JOBS GO TO TEXACO

## CATERPILLAR TRACTOR CO.

is commemorating throughout 1954 the fiftieth anniversary of the track-type tractor . . . and Texaco is happy to join the celebration. For nearly twenty-five of those "Fifty Years on Tracks," Texaco Lubricants and Lubrication Engineering Service have been helping Caterpillar keep its production high, its costs low.



IN MACHINING, for example, Caterpillar has long used *Texaco Soluble Oils*. They assure better cutting, better finish and longer tool life because emulsions are more stable, and cool and lubricate better. They also assure a cleaner plant and lower oil consumption.

In addition, the know-how of Texaco Lubrication Engineers and their interest in keeping abreast of Caterpillar's problems have been helpful factors in achieving maximum machining efficiency.

Why not enjoy the benefits of Texaco Lubricants and Lubrication Engineering Service in *your* plant? They are available everywhere. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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TEXACO REG. T.M.

**TEXACO** CUTTING, GRINDING, SOLUBLE AND HYDRAULIC OILS

TUNE IN . . . TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE on television . . . Saturday nights, NBC.

# Gaging Metalworking . . .

**PRODUCTION INDEX**
BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

| | OCT '54(*) | SEPT '54(p) | AUG '54(r) | SEPT '53 |
|---|---|---|---|---|
| **Tot. Index...** | **145** | **146** | **148** | **166** |
| **Machinery** ..... | 123 | 126 | 141 | |
| **Electrical Machinery** ..... | 185 | 181 | 200 | |
| **Autos** ..... | 83 | 97 | 110 | |
| **Other Transportation** .... | 302 | 290 | 316 | |
| **Other Metalworking** ..... | 124 | 126 | 140 | |

(*) Estimated (p) preliminary (r) revised

**Metalworking seems to be looking up at last,** after a long movement either sidewise or downward.

**Sentiment in many segments of the industry** is the most cheerful this year. Beyond that, and far more important, actual sales have picked up in many lines.

**The drive to get out 1955 car models to dealers** is having a stimulating effect on a variety of industries selling directly or indirectly to automobile manufacturers.

**But the upturn is much more sweeping** in its breadth than that. It extends into farm implements, into household appliances, into machine tools.

**There is no telling how long this gain will last.** Perhaps it is only temporary. But it is genuine right now. And signs point to a continuation in the immediate future.

• • •

**Nowhere is the turn-around more noticeable** than in steel. Not long ago the steel industry was in the doldrums. By contrast, steel salesmen are predicting that a shortage of certain types of steel will show up by the end of the year. They have in mind sheets as the hottest item.

**These facts are cited** not to indicate that any runaway market looms in steel but rather to illustrate that sentiment and sales have been reversed. There is much less hand-to-mouth buying. Some large buyers are starting to build up inventory again.

• • •

**Inquiries in the hands of stamping plants** point to early introduction of new models of all kinds of metal products. Tooling for many of these models in stamping shops has not yet been completed.

**Home appliance makers have placed liberal orders** with stampers. The full effects of this business will not be felt for 30-60 days.

**Operations in the stamping industry** once more are close to normal, though nowhere near a boom level.

• • •

**Both shipments and orders are bigger** in the drop forging industry. Customers are shopping around more than in years. But most shops have enough business to run one shift five days a week for the next few months. That is the best in months. Aircraft companies continue to be good buyers of forgings.

**A few forging shops** report that September was the most active month this year.

• • •

**The New Order Index of Industrial Supplies** and Machinery has risen sharply since hitting a new low in the summer, the American Supply and Machinery Manufacturers' Association reports.

• • •

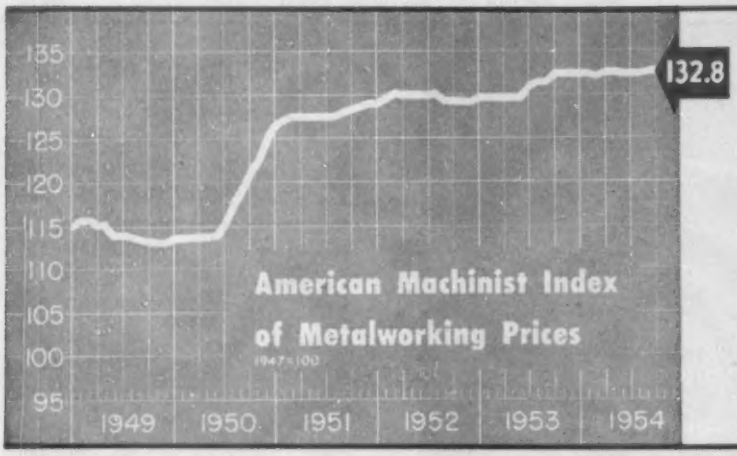
**Tool and die people report a big jump** in shipments in August, when they rose 25% over July and were 102% of August 1953 shipments. But for the first eight months of the year, shipments ran 90% of last year.

**But industry officials say** too much significance shouldn't be attached to the August jump, because many tool and die shops were shut down for vacations in July.

**New tool and die orders in August** showed an 8% increase over July, but the industry's backlog dropped 7% to a point where it is practically non-existant, and employment in the industry dropped about 1%.

**Smaller shops are giving big ones a headache** by scuttling prices to keep their shops open.

# Gaging Business . . .




## PRICE INDEX

| | OCT '54(*) | SEPT '54(p) | AUG '54(r) | SEPT '53 |
|---|---|---|---|---|
| **Total Index** | **132.8** | **132.8** | **132.6** | **132.5** |
| **Metalworking Machinery** | **142.4** | **141.7** | **141.8** | |
| **Other Machinery exc. Electrical** | **137.5** | **137.4** | **137.0** | |
| **Electrical Machinery** | **130.9** | **130.9** | **131.4** | |
| **Fabricated Metal Products** | **129.2** | **129.1** | **129.0** | |

(*) Estimated (p) preliminary (r) revised

**Business is still running along in neutral gear,** more or less. Industrial production, for example, just started to inch up in October.

• • •

**From January through September,** industrial production varied less than 1%. But new auto orders began to make themselves felt in October, although their full impact on metalworking and industrial output won't really start to register until sometime this month.

• • •

**Total employment held at 62.1 million jobs** in October — the same as for September. But unemployment declined — an indication that women and students left the labor force, since few new jobs came into existence.

• • •

**Unemployment dropped below the 3-million mark** in October for the first time this year. Normal October unemployment decline is about 150,000. This year, unemployment dropped 358,000.

• • •

**Factory workers' weekly pay averaged $71.86** for September — an all-time high for the month. September pay checks ran 80¢ higher than August's. And they bought more, too.

**Cost of living dropped in September** for the second straight month, mainly because of drop of 1.3% in food prices. The current level is now 0.6% under October 1953's all-time high of 115.4. Most of the drop was centered in declines in the price of coffee and fresh vegetables.

• • •

**Housing starts rose in September,** contrary to usual seasonal trends. Non-farm dwelling unit starts totaled 114,000 — 3000 more starts than in August. On a seasonally adjusted annual rate basis, September starts indicate a rate of 1.2 million units a year.

• • •

**McGraw-Hill's Index of New Orders for Machinery** (except electrical) shows a decline of 3% in September, after seasonal adjustment, but it's only 2% below a year ago.

## WEEKLY BUSINESS INDICATORS

| | Latest Week | Preceding Week | Year Ago |
|---|---|---|---|
| *Business Week* Index of Activity (1947-49 = 100)* | 121.8 | 121.5 | 131.5 |
| Steel ingot production (thousand tons) | 1,772 | 1,769 | 2,132 |
| Electric power output (million Kilowatt hours) | 9,033 | 9,117 | 8,306 |
| Production of automobiles and trucks | 61,680 | 59,511 | 149,794 |
| Engineering construction awards (*Eng. News-Record*—millions) | $220.2 | $323.2 | $358.4 |

## MONTHLY BUSINESS INDICATORS

| | Latest Month | Preceding Month | Year Ago |
|---|---|---|---|
| Refrigerators sales (thousands of units) | 257 | 325 | 233 |
| Vacuum cleaners sales (thousands of units) | 185 | 194 | 185 |
| Washers sales (thousands of units) | 293 | 243 | 291 |
| Household electric ranges sales (thousands of units) | 76 | 80 | 74 |
| Radio production (thousands of units) | 785 | 437 | 992 |
| Television production (thousands of units) | 633 | 307 | 604 |
| Gear sales index (1947-49 = 100) | 154.7 | 141.3 | 121.6 |
| Foundry equipment new orders index (shipments, 1947-49 = 100) | 75.6 | 68.8 | 633.3 |

* Seasonally adjusted

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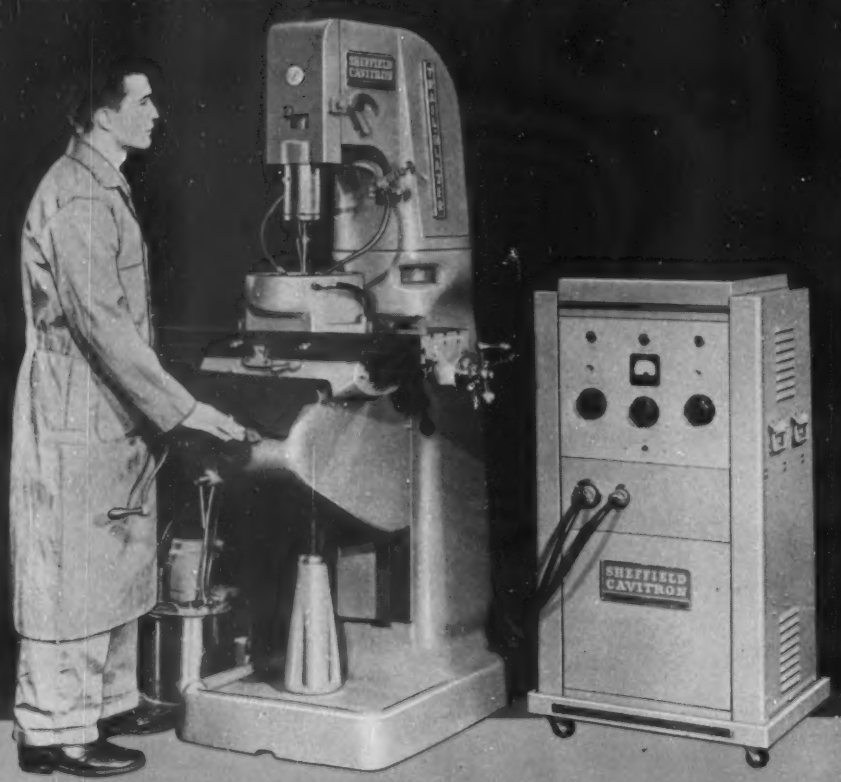

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# SHEFFIELD

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

# Getting the Most Out of Your Machines

Resistance of workers to mechanization of production processes goes way back.

It seldom takes the form any more of active opposition to installation of new machines. It crops up instead in the unwillingness of operators to run new automatic machines at anywhere near their actual capacity to handle work.

Lately, however, we have heard encouraging news on this subject from a number of metalworking shops. Production, they report, is much higher with the same work force, or even with fewer men. Machines are being run faster. The operators are getting more out of them.

You don't have to look long and hard for an explanation. Jobs do not come as easy as they did. No longer can a man do indifferent work and if fired, walk across the street and start in on a new job tomorrow.

We are over the peak. Business still is excellent by all standards except 1953. But you can't pick jobs off trees any longer. Business is not that good.

That is not the whole answer, of course. The fact is that competition is back with a vengeance. Instead of going steadily upward, prices are not as firm as they used to be. If you want proof, do a little dickering with a car or household-appliance dealer and see what happens.

If prices are subject to pressures, production costs must come down. That means that every segment of the manufacturing procedure is being closely scrutinized in an effort to increase efficiency.

What is more natural than to concentrate on getting the most, and the best, out of your current resources of both men and machines?

In exerting this effort, many managements have resorted to the intelligent action of putting before their workers the economic facts of life as they affect the company's business. Often an appeal is made to the individual man to put a little more into his job day by day.

No matter what the exact explanation is, productivity is up in too many metalworking shops for it to be merely accidental. And much of the gain in productivity comes from getting more out of the machines in the shop.

The upward swing is sufficiently pronounced that it is leading some companies to restudy standards and incentives. Others are likely to follow suit.

And that inevitably raises an important and provocative question: Why set new standards for performance on obsolete equipment? "These days a man's performance is based far more on the machine than on the man," one shrewd observer remarked recently.

All of which leads to the conclusion that a study should be made of the age and condition of your productive equipment before you actually establish new rates. Whatever replacements you decide upon should become an accomplished fact prior to the time that a final decision is reached on standards and incentives.

Only if you do exactly that will you be able in the next few years to get the most out of your men and out of your machines and thereby achieve new goals in productivity and, in turn, in lowered costs.

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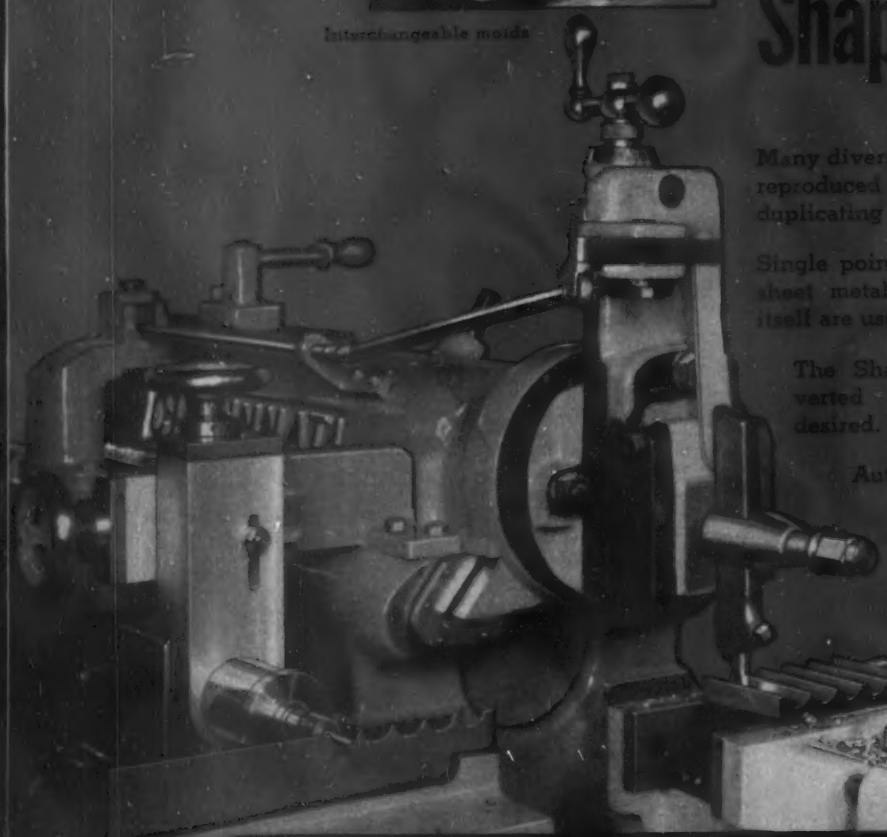

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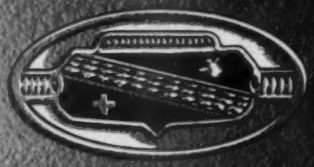


American Machinist

SPECIAL REPORT
NUMBER 378

# NEW TOOLS . . . AUTOMATED MAKE '55 CARS

$1.1-billion, largest outlay ever, was made by automotive plants for new machines, tooling, automation, and setting up or rearranging lines for '55 production. Here is a 48-page roundup of key setups that point trends. Included are a 3-page summary and 44 pages of pictures with detailed captions, in plants of . . .

**PONTIAC . . . BUICK . . .**

**PACKARD . . . CHRYSLER . . .**

**AC SPARK PLUG . . . SAGINAW STEERING GEAR**

COPYRIGHT 1954 BY McGRAW-HILL PUBLISHING CO. 330 W 42nd ST. N.Y. 36, N.Y.

# Why $1.1-billion was spent on

More engine, body and engineering changes are being made in the 1955 car models than have ever been made in any one year. Companies have for three years been gearing for 1955 as the year of the greatest sales pitch.

Twelve new body stylings will appear. Pontiac, Chevrolet, Chrysler, the Imperial (now distinctly separated from Chrysler Div), DeSoto, Dodge, Plymouth, Ford, Mercury, Packard, Nash and Hudson all will have importantly changed body designs. Even some of those companies which introduced new over-all body stylings in 1954 (Buick, Oldsmobile, Cadillac, for instance) have undertaken rather major alterations. No longer can a company afford to offer the same body styling year after year with little more than chrome—nor can a company introduce a radically different body design successfully to our ultra-conservative mass buyers.

Enginewise, Packard, Pontiac, Chevrolet and Plymouth have new V-8s. Chrysler is extending its V-8 to its Windsor series, and Dodge has made modifications of its V-8 to offer a more powerful engine in its Royal and Coronet series. Studebaker, too, made large-scale modifications in its V-8.

Optional power packages are due in many lines. Chevrolet, for instance, is rating its new V-8 at 162 hp, but offering an optional power package that boosts horsepower to 180. Dodge's standard V-8, using a dual-throat carburetor, will rate at 183 hp. If the buyer wants more, he can order an optional package, which includes a four-barrel carburetor and dual-exhaust system that adds 10 hp. Similar power options will be available in some Ford lines.

Various transmissions have undergone rather costly renovation, too, as in the case of Packard's Ultramatic and Buick's Dynaflow. Lincoln, previously a Hydra-Matic user, is introducing its own transmission. Essentially, it will be a beefed-up version of Mercury's automatic transmission.

Packard is due to show off one of the most radical suspension system changes in years and Chevrolet has picked up the ball-joint suspension design.

### BIGGEST TOOLING YEAR

All of these changes make 1955 the biggest year in automotive history in terms of over-all expenditures for new machines, tools, fixtures, handling equipment and preparation for production (that is, the cost of setting up new production lines, rearranging others, etc).

For the entire industry, investment in tooling for the 1955 programs amounts to approximately $1.1-billion. That represents the entire tooling package for all companies except Ford—which is not talking—and is in excess of actual financial outlay made during 1954. That is, figured into the total is the "carryover"—tooling bought a year or two or more ago and still being amortized, but usable in 1955.

Some companies, like Ford, have been able to pay for retooling out of earnings. Others have paid partly out of earnings, partly by going in debt. GM in the last year issued $300-million in debentures. Chrysler reached a $250-million loan agreement with Prudential Life Insurance and received 62.5-million of that July 1. The new Studebaker-Packard Corp arranged to borrow $70-million and American Motors Corp drew down almost $70-million of a $73-million line of credit.

### AUTOMATION IS A TREND

Automation, just a new word six years ago, is today the outstanding trend in the automobile plants. Degree varies with available capital, expected production, frequency of design change, and planner's preference, but automatic equipment and automatic handling are the order of the day, as subsequent pages amply prove.

Yet, two major makers, when asked how their tooling expenditures for 1955 are split up, indicated that "automation" represented only 5% of the total. (One assigned 75% to machine tools and 20% to tooling, the other 80% to machine tools and 14% to tooling.) This, on the surface, makes automation pretty small potatoes. But the answer lies deeper and is more significant.

The 5% for automation represents only roll-over, turnabout, and other special fixtures, plus the automatic devices between machines; it does *not* include built-in loading and unloading devices, transfer-machine internal conveying, and the like put in machine tools by the builders.

There is a surprising reluctance among nearly all auto makers to get down to cold facts and figures when discussing automation, even when it comes to nothing more than a simple definition of the word.

"Automation is any operation that removes a man from production," said one Big Three manufacturing boss. Then he added: "But don't pin my name on that. We have a labor problem to think of." Said another: "We don't use that word. We just say new manufacturing methods, new machines, new equipment, and let it go at that." And another: "That's an over-used, coined word which refers to the mechanical handling of material between operations."

The definition cited first, ". . . . any operation that removes a man from production"—pops up all over the industry in substantially the same phrasing. But always with the warning: "Don't use my name."

On the surface, that appears to be an over-cautious attitude. Walter Reuther, president of the CIO United Auto Workers Union and the CIO itself, has noted publicly on several occasions that the union has no quarrel with advanced manufacturing methods, per se. Reuther's approach is that technological improvements are desirable, so long as the worker is permitted to share in the profits.

With labor costs generally rising steadily (discounting scattered cuts such as Studebaker workers voted to take), industry is forced to seek economies in other areas. That accounts largely for the accelerated search for more and better automatic devices.

### MARKET AFFECTS AUTOMATION

Aside from rising labor costs, another factor helps rule the swing to wider use of automatic machines: the fluctuating auto market.

Last year, GM produced less than 46% of all cars turned out. This year, it will build upward of 53%. Last year, Chrysler accounted for over 20% of the industry total. This year, it will sink to a point probably somewhere around 12%. Ford had less than 26% of the total in 1953. This year, it holds more than 31% of the market. The six auto makers who comprise the "independents" turned out nearly 9% of last year's total. This year, they'll account for less than 4%, from all indications. In other words, GM and Ford have made giant gains at the expense of Chrysler, American Motors, Studebaker-Packard and Kaiser-Willys.

If a company's share of the market decreases so that it must rely on wider margins of profit per unit, then automation is one way to reach that end. And if industry leaders are to stay competitive, they too must keep costs as low as rival firms. Either way, it means more automation, despite the growing pains of new production processes.

"By whatever name you want to call it," said one Big Three spokesman, "automation is certainly the manufacturing process of the future."

Perhaps it is better that we pause here to define automation, a word that has become a byword, a magic wand. Coupled with the phrase "automatic factory," it has been the torch leading a new crusade, but so misused and overused that some shop executives are sick and tired of it.

# retooling ... and how

Actually, the word was coined by D S Harder of Ford Motor Company. Someone had asked for means of handling parts in process of manufacture without some of the delays caused by the human element. Mr Harder said, "What we need is more automation." About the same time, the name was applied to a special task force set up to study and mechanize loading and unloading on new equipment received by Ford. This group of experts worked first on presses, then on machine tools. The term first appeared in print in *American Machinist*, in the first article about the activities of this group (AM-Oct 21, '48, p107-122). There we defined automation as ". . . the art of applying mechanical devices to manipulate workpieces into and out of equipment, turn parts between operations, remove scrap, and to perform these tasks in timed sequence with the production equipment so that the line can be put wholly or partially under pushbutton control at strategic stations."

### AUTOMATION IS OLD

Development of the concept at Ford led to further reports in *AM* and gradually in one publication after another. Meanwhile, other companies used the word and developed variants, one of them "fleximation," indicating an automated line of primarily standard tools with very flexible tooling to take care of design changes. But no one anticipated the public seizure of the word and its use, and production men generally have been confused by the apparent lay belief that mechanization of production lines has just begun. Actually the first metalworking steps in that direction were taken by Henry Ford in 1910 when he put in an assembly line, and the first "automatic factory" was built in 1928—the A O Smith auto-frame setup. And, outside Metalworking, where processes are simple and volume great—drugs, chemicals, food, oil-refining—automatic plants have been common for years.

Be all that as it may, "automation" is definitely in the language, as well as the mode. The next edition of Merriam-Webster's International Dictionary will probably say: **"automation,** n, 1. The act or technique of making a manufacturing process fully automatic. By this technique parts are moved into and out of machines without being handled by human operators. 2. The state of being automatic. 3. Automatic operation, as of a machine."

Mr Harder himself, in a speech August 27, said that automation is "a new philosophy of manufacturing" and that the original Ford definition of it as "the automatic handling of parts between progressive production operations" must now be broadened to include design of parts, methods for their manufacture, and production-tool control systems. W E Brainard of Hughes Aircraft has given the definition which Mr Harder prefers: "Automation is more than merely transferring. Nor is it a pushbutton factory. It is a philosophy that may extend back to the design of the product. It is a new method of manufacture, not necessarily a new way of cutting metal, but a way of controlling the various processes. Automation is a philosophy of design, it is a manufacturing method, and it is control within a machine." (*Production*, Feb, 1954)

With so many definitions available, we may perhaps be pardoned for pointing out that this new philosophy is really a very old one and that the correct name is neither "automation" nor "fleximation," but "emancipation." The first man who stood erect was the slave of his environment, then the slave of other men. The Industrial Revolution doomed personal slavery more surely than Abraham Lincoln's proclamation of 1863, although it in turn enslaved man to the machine. But now man becomes the master of the machine—a specialist directing a job, not a helot doing it. In fact, the indications are that "labor" may soon be an obsolete term for the working man. Physical labor is practically gone in production; our whole concept of the relationship—or lack of it—between "capital" and "labor" may be changed. "Workers" now will have less-monotonous, more highly skilled, and far-safer jobs, supervising a machine that does the work without fatigue and resultant inaccuracy and drop in efficiency, to accuracies man cannot match unaided. Here again, man has extended the reach and utility of his arm and his mind.

### A BILLION—IN A YEAR

The 44 pages of pictures that follow will give you a good idea of how Detroit is spending its billion dollars. That's $6 for every man, woman, and child in these United States. Why so much, considering quite large expenditures for each of several years past? Here are some cogent reasons:

1. Competition is back with a vengeance. Designs must be changed on a frequent cycle, and radically, to provide sales arguments.
2. Automobile retail prices have risen astronomically. Buyers feel all cars are too expensive; prices of "small" cars are too close to those of "big" ones. Costs are too high.
3. Since 1946, changes have been largely face-lifting; tooling has averaged a comfortable 3-year amortization.
4. Machine-tool builders are offering startliing automation developments as a result of their own fight for business.
5. New, and more economical and powerful engines (today the V-8, maybe the turbine in a few years), new transmissions, new suspensions, and brand-new body designs (foreign styling, 4-door hardtop sedans). One new engine, just 3 years old, is due to be replaced.
6. New materials, new knowledge of metallurgy and machining.

### THE TRENDS

Basically, there is much similarity in automated lines, because car manufacturers do interchange production data and planning ideas to some extent. Machine-tool builders and other suppliers also carry ideas back and forth, and have worked with one another and with the buyer's engineers to a much greater extent than in previous years. There are minor differences, such as use of tool-control boards in one case vs gage systems in another, or Pontiac floor-level sectioned chip conveyor going *through* machines while Packard has an underfloor one *under* the machines. These are mostly differences of opinion. In the latter case, for example, Pontiac engineers believe their system simplifies maintenance because the conveyor is easier to get at; Packard engineers feel this is no problem.

Production-volume differences are also a factor. Pontiac has *no* manual handling in the block line; Chrysler has some here and there because of smaller volume. Again, Pontiac has automatic crankshaft and camshaft lines; Packard loads and unloads manually at some machines, for the same reason. Production costs must be cut, but volume and budget must be considered too in automating.

Most obvious among trends is that toward reduced labor costs, of course. Pontiac's fully automated connecting-rod (first in the industry) and piston lines, Buick's pinion line, Detroit Transmission's pinion line—these are all examples. Buick, for example, needs four pinions for each transmission, or some two million a year. The way to do it most economically is to automate—and double the production. The new automated lines at Ford are much smoother than the original lines—there is more automation, much advance toward complete automatic handling.

Special machines are another indication of the adoption of mechanization. One rotary at the beginning of the Pontiac piston line does about 50% of the machining before pistons start through the line; 6 transfer machines in the con-rod line replace 40 conventional machines and up output 25%. And Buick in its pinion line has all sorts of "standard" (?) machines with special loaders and unloaders (see front cover), inspection and sorting devices. Yet the fact that machine tools are basically standard units is indicative of the planning for rapid and economical retooling for design changes. This cannot be overemphasized—that special machines go where volume is large and design changes are infrequent, standards go under the opposite conditions, but automation is used to the hilt under both.

### THE PLANTS THEMSELVES

Just as statistical and survey data in preceding paragraphs are the work of our Detroit news editor, Jim Jones, descriptions on following pages are the selections of George De Groat, *AM* associate editor resident in Detroit, from the thousands of new installations he has seen in the past few months. In each case he was advised by production executives of the particular plant, and in basic choices of the plants themselves by company executives. In one instance, the article was prepared by a Saginaw Steering Gear man; all others are Mr De Groat's own work. Here are impressions of the whole program:

**General Motors** . . . Almost all GM divisions have installed new machines, new lines, or new plants. Pontiac and Chevrolet have both undertaken major retooling programs, apparently in preparation for a '55 sales drive as intensive as those of Buick and Oldsmobile this year. That means restyling—a new engine, new transmission, new body design. With their production volumes, automation, special machines and ultra-modern methods are essential. Of the two, we chose Pontiac for detailed case study. Pontiac has retooled its engine, axle, and sheet-metal plants, its foundry and its plating setup; Chevrolet the same. Here, in 22 packed pages, we cover the Pontiac engine plant and its radically new transfer machines and automation. The outstanding 40 or 50 machines of a total of 650 new ones, (counting a transfer machine as one) and 200 automation units are shown. Here are the results of three years of planning (first machine orders were placed in May '52). Thousands of vendors and suppliers have been involved (see sketch below). We also show something of the two miles of wet-chip sluiceways, the mile of chip conveyors, and the 360,000-cfm dust-collecting system.

As indicative of retooling in other GM plants, we have selected the assembly line for air cleaners at AC Spark Plug and the world's largest coolant-reclaimer at Saginaw Steering Gear, plus data on the Buick Dynaflow transmission line. Detroit Transmission has installed an automated line for bearing-cap production, and a pinion line, Buick a fully automated pinion line, Oldsmobile a new plating plant.

**Chrysler** . . . Major restyling has been backed by extensive retooling. We have selected the automated V-8 engine line. (V-8's will replace straight 6's and 8's which moves major engine-building facilities from Trenton, Mich, to Detroit. Chrysler is also retooling the Mack plant (sheet-metal stamping), and has made other extensive changes.

**Packard** . . . Feeling here is that the industry will stay with the new, smaller V-8 engine, so Packard, like Pontiac and others, is fully automating block and head lines. Special machines have been installed where major design changes are not anticipated—center-drive lathes with special loaders and unloaders in the crankshaft line. Standard machines with automation are used on such lines as those for gears, where frequent changes occur. We've selected Packard's engine and transmission lines for description, because we felt that these are typical of latest planning for reasonable quantities and an excellent contrast to our Buick and Pontiac descriptions. Packard plans amortization in less time than GM, has ½% of its expenditure in coolant and chip systems, part of a total of 13% in plant engineering (coolant and chip systems, dust disposal, spray booths, washers, warehousing, receiving and storage, laboratory, materials handling, engine test, furnaces). Packard plans higher production for the future, both because of anticipated sales and because of the "AMC" program, by which Packard will provide V-8 engines and ultramatic transmissions to American Motors for the Hudson *Hornet* and the Nash *Ambassador*. Many machine tools have been shifted from the main plant to the new one, so facilities there are bigger than the apparent investment.

E J Tangerman
*Executive Editor*

**77 CITIES IN 17 STATES SUPPLIED MACHINES AND TOOLING FOR THE PONTIAC V-8 STRATO-STREAK ENGINE PLANT**

**CONNECTICUT**
Bridgeport
New Britain
Stratford
West Hartford

**ILLINOIS**
Champaign
Chicago
Des Plaines
Rockford

**INDIANA**
Indianapolis
Mishawaka
Richmond

**MASSACHUSETTS**
Boston
Cambridge
Fitchburg
Greenfield
Hudson
Springfield
Worcester

**MICHIGAN**
Ann Arbor
Bay City
Birmingham
Clarkston
Dearborn
Detroit
Ferndale
Flint
Hazel Park
Jackson
Lake Orion
Lansing
Milan
Milford
Muskegon
Napoleon
Oak Park
Owosso
Pontiac
Royal Oak
Saginaw
Van Dyke
Walled Lake

**MINNESOTA**
Minneapolis

**MISSOURI**
St. Louis

**NEW HAMPSHIRE**
Keene

**MARYLAND**
Hagerstwon

**NEW JERSEY**
Matawan
Newark

**NEW YORK**
Long Island
Rochester
Poughkeepsie
Seneca Falls
Syracuse

**OHIO**
AKron
Canton
Cincinnati
Cleveland
Dayton
Sharonville
Hamilton
Springfield
Toledo
Warren
Youngstown

**PENNSYLVANIA**
Homer
Meadville
New Castle
Philadelphia
Waynesboro

**RHODE ISLAND**
Providence

**TEXAS**
Dallas
Forth Worth
Houston

**VERMONT**
Springfield
Windsor

**WISCONSIN**
Beloit
Madison
Milwaukee

# PONTIAC

A big part of General Motors Corporation's "billion-dollar bet" on the future, announced late in '53, has been covered by the multi-million dollar re-tooling program recently completed at Pontiac Motor Div, Pontiac, Mich. Here new equipment, new tools and new facilities have been installed in the sheet-metal, engine, and assembly plants, as well as in the foundry and axle divisions.

According to Tom Seavey, general master mechanic, in the engine plant alone, where V-8's for '55 are being built to replace straight 6's and 8's, millions of dollars have been invested in automation equipment, special machinery and small tools. A good share of the investment was also devoted to chip-disposal, dust-collection, and coolant-reclaiming systems. Transfer machines, automatic handling devices and other specially designed equipment make the cylinder head, cylinder block, piston, connecting rod, camshaft, and piston pin lines the most up-to-date in the industry.

Although completely automatic handling and processing has been established throughout the plant, unnecessary frills have been avoided. Automation has been held to practical limits; expensive equipment was not purchased to automate parts production where amortization would require an excessive length of time.

Distribution of expenditures for new equipment breaks down to approximately 75% for machines, 20% for perishable tools and 5% for automation. The latter relatively low figure is probably accounted for to some extent by the fact that machine-tool builders were asked to design automatic loaders and unloaders into their machines rather than leaving these elements as special automation equipment.

Planning the program took well over 3 years and involved thousands of suppliers and vendors. First machines were ordered in May, 1952. Since then, some 650 (counting transfer machines as one each) have been installed. Automation equipment amounts to 200 pieces, not including transfer, rollover and other fixtures. Complete cooperation of machine-tool builders with each other and with Pontiac engineers, who laid out all processes and planned the entire program, contributed largely to the success of the operation. Evidence of good planning and smooth-functioning cooperation amongst all concerned lies in the fact that installation of the new V-8 engine plant and removal of equipment for 6's and 8's, (to be continued in production elsewhere for service replacements) was carried out without disrupting schedule during one of Pontiac's most productive years.

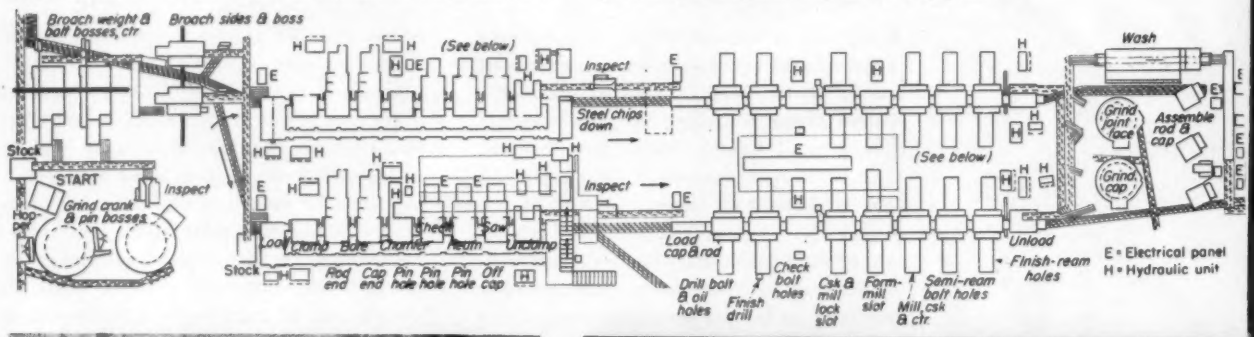
According to Robert M Gritchfield, vice president of General Motors and general manager of the Division, the automatic machinery and automation installed here are expected to raise the standards of quality and economy in mass production. Pontiac employees are pleased with the new installations because they are quieter and require less exertion. Moreover, there is strong evidence that the extensive tooling program now completed at Pontiac will have a far-reaching effect on the future of automation. Selected case studies from the new lines in the next 24 pages provide evidence of this, as well as new ideas on up-to-the-minute machining methods.

THE PONTIAC STORY OF NEW TOOLING FOR '55 TOLD IN PICTURES . . .

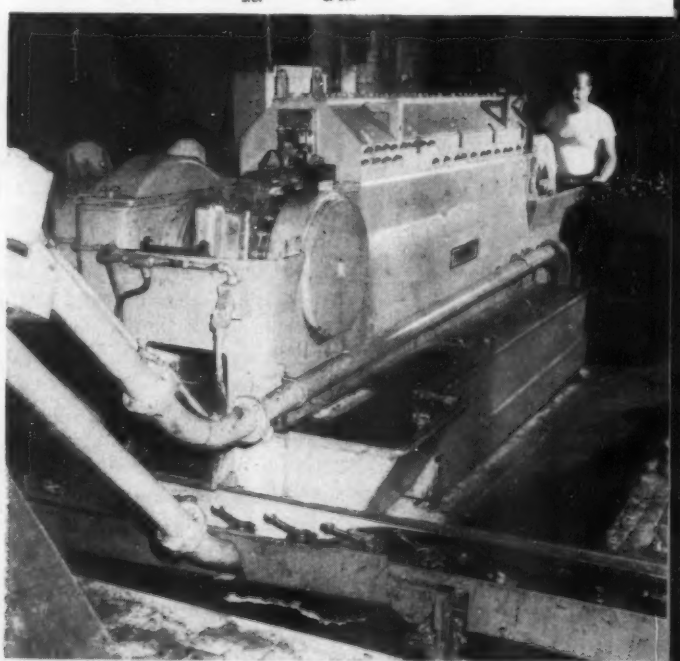
# PONTIAC

## First automated con-

**TWO AUTOMATED LINES** increase connecting-rod production by more than 25% over old methods. After receiving inspection, where rough forgings are spot checked for weight, they are automatically loaded, unloaded, and transferred from one machine to another without need for sorting to specified weights as long as they are within tolerance. Various types of conveyors carry them to machines for grinding crank and pin bosses, automatic inspection and broaching bosses and sides. Transfer machines are automatic, too, and, following operations in the second one in each line, joint faces are ground and the work is cleaned. Caps and rods are then assembled in an air press and bolts fastened to a specified torque in a hydraulic torque machine, after which they pass through the third transfer machine. Final operations include weighing and burring, finish-grinding crank and pin bosses, automatic inspection, boring crank and pin holes, honing crank holes, and bearingizing pin holes, washing and automatic final inspection



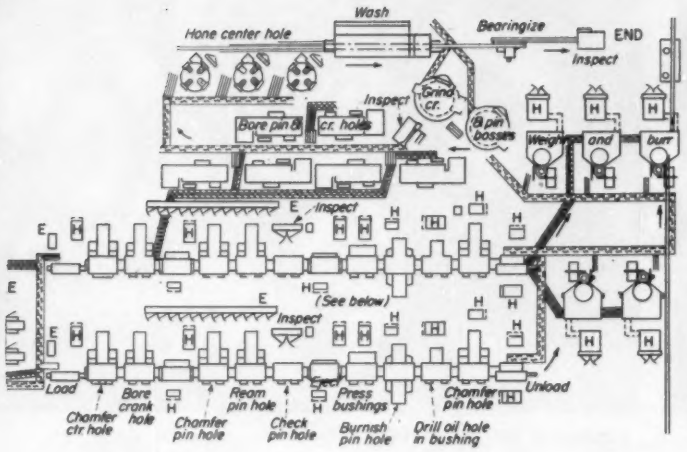
**GRINDING CON RODS** eliminates cold straightening. Here, a 60-station Mattison rotary vertical machine rough-grinds crank and pin bosses at 1700 per hour. Machine is equipped with an automatic unloader that feeds a small conveyor for transfer of the work to an automatic gage for inspection



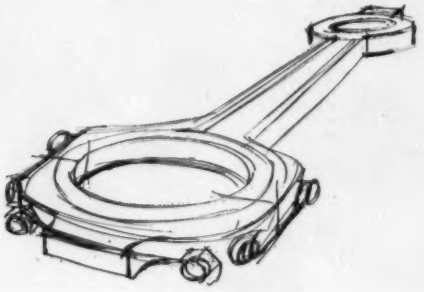
**CONTINUOUS TUNNEL BROACHING** in Foote Burt machines follows automatic inspection and grinding crank and pin bosses. In an adjacent machine, weight and bolt bosses at the crank end are broached; here the sides and weight bosses at the pin end are broached at 33½ sfm with HSS broaches. Work is ejected onto a small belt conveyor which feeds a flight conveyor for loading the first transfer machine in each line

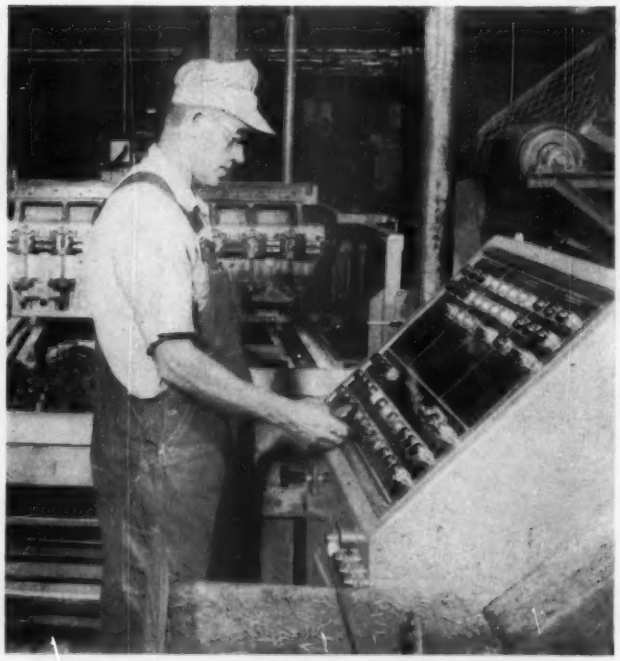
# rod lines

**Automated production of connecting rods presented a real challenge to machine-tool builders and Pontiac engineers. Here's the first automated line in the industry—where 6 transfer machines, (3 in each of two lines) replace about 40 conventional machines. Parts are processed automatically from start to finish via conveyors, automatic loaders and unloaders, and special processing and inspection equipment in addition to the transfer machines**

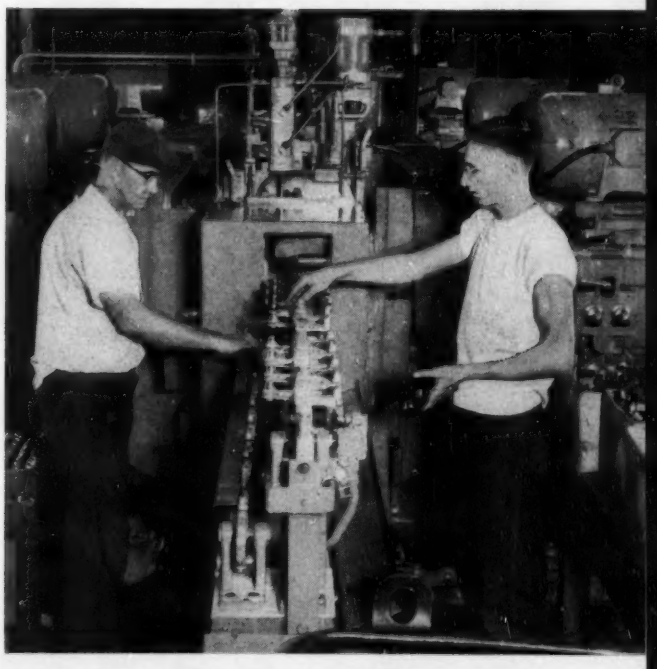



Area = 18,860 sq ft



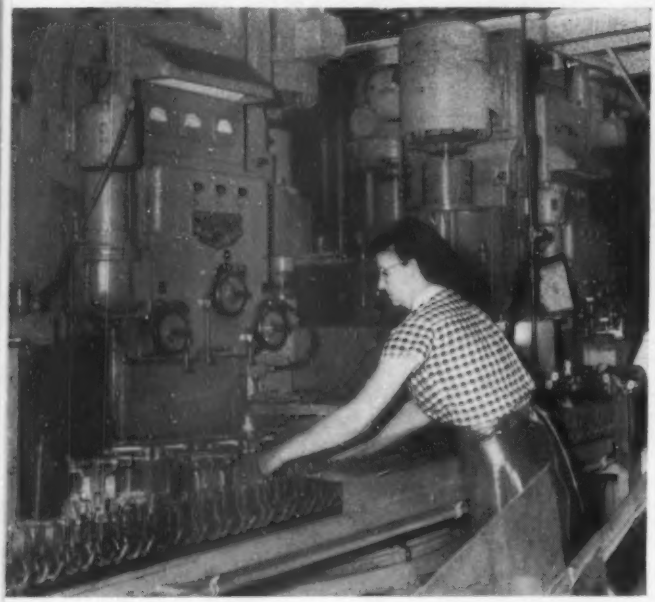


**FIRST TRANSFER MACHINE** in the line eliminates 8 conventional machines previously required for processing connecting rods. Single-piece rough forgings are loaded into pallets and transferred through, clamped in nests without being subjected to stress. Operations performed here include milling the sides of crank holes using two centers on each side to allow parting stock when hole is made round later. Drilling, probing and reaming pin holes follow, after which caps are cut off and automatically unloaded, together with the rods, into an automatic Sheffield gage for inspection prior to processing through the second transfer machine

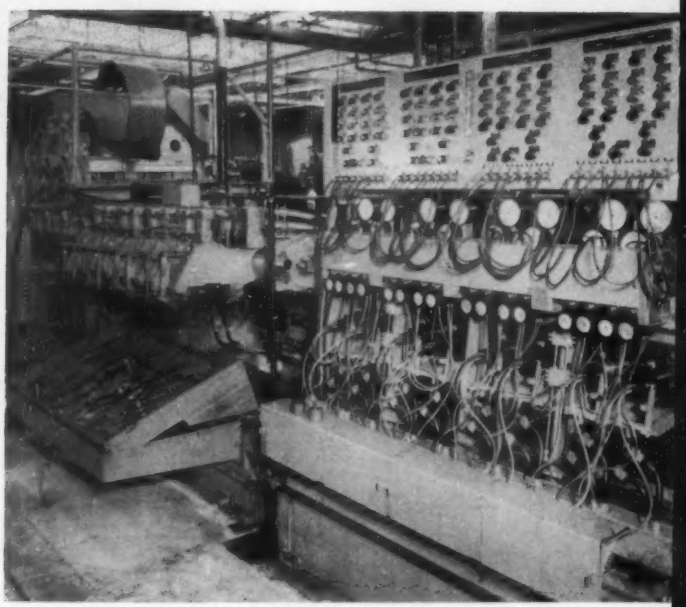


**CAPS AND RODS ARE MACHINED SEPARATELY** in second Greenlee where oil and bolt holes are drilled, chamfered, and counterbored and oil grooves and locating slots are milled. As in other setups, nests are employed to hold work to eliminate setting up stresses in machining. Rods and caps are automatically unloaded into a conveyor for transfer to grinding operation on joint faces.

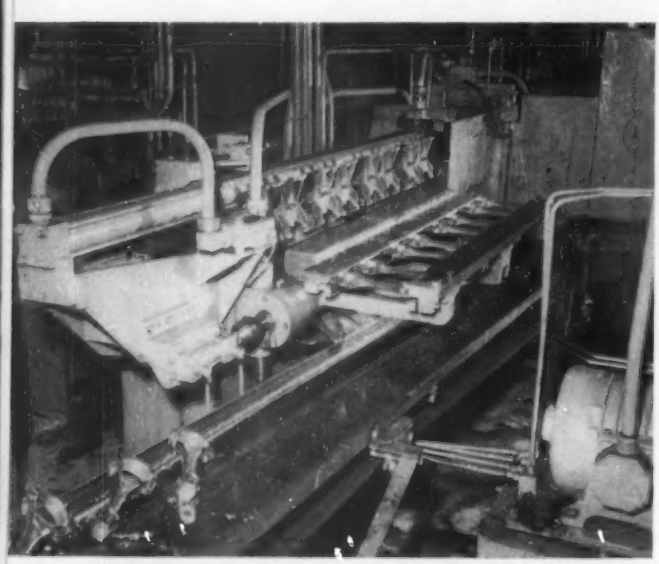
*CONTINUED ON NEXT PAGE*



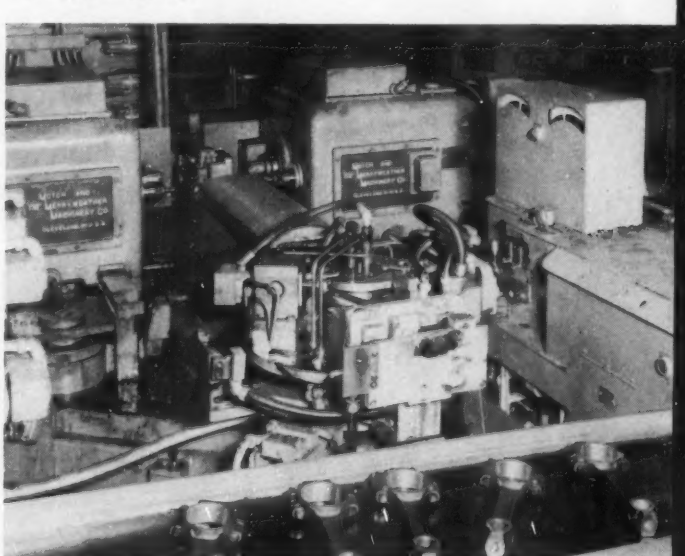
**SPLIT CONVEYOR** transfers caps to one Mattison grinder, rods to another, for grinding joint faces square and clean for assembly. After grinding, a second conveyor containing special racks for each part, carries them through a washer, after which they are automatically unloaded into a belt conveyor for transfer to assembly. Grinders are 48-station, vertical rotary machines equipped with nests to maintain a high degree of accuracy without setting up stresses in either part



**AUTOMATIC GAGING STATION** in third transfer machine checks pin holes in con rods, rejects parts not to gage standards. This is 7th station in a 14-station Greenlee where crank holes are semi-finish reamed, pin hole is finish reamed and both are chamfered through first 6 stations. Next station is automatic rejection of parts which do not meet gage standards. Subsequent operations include automatic assembly of pin-hole bushing, automatic burnishing with tungsten-carbide balls, drilling oil holes in bushing, and chamfering both ends of bushing



**AUTOMATIC UNLOADING** of third transfer machine is accomplished by hydraulic platen that swivels through 90° arc to place finished connecting rods in a horizontal plane. Lever-operated bar is moved slightly to free rods which drop out of platen onto conveyor. Rods are transferred through the machine in troughs which hold them at top and bottom and permit locating and clamping in nests at individual stations

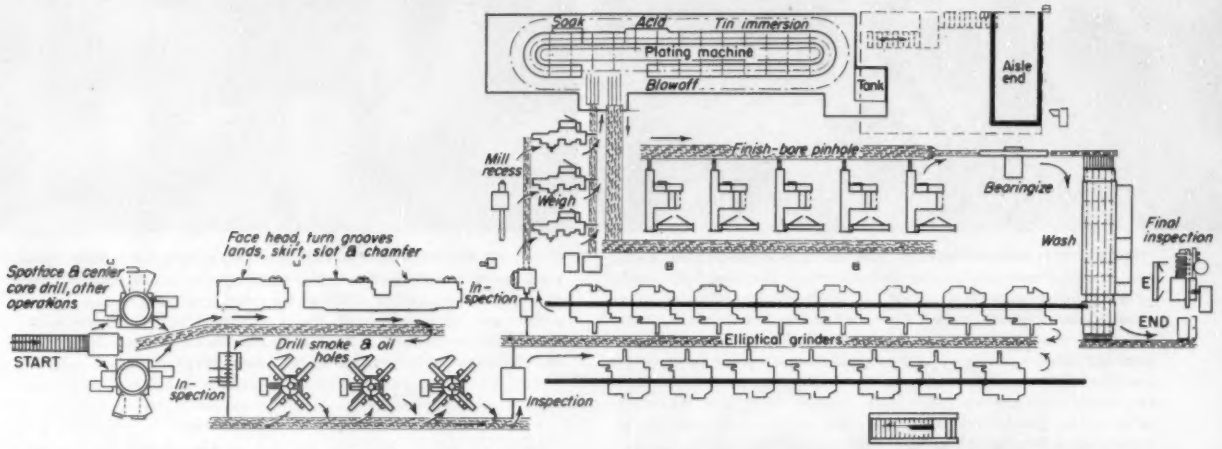


**AUTOMATIC WEIGHT** mill keeps con rods uniform in weight within ½ gm. Rods can vary in weight as much as 60 gm, and scale will preset machine to remove correct amount from bosses. As a result, rods can be processed through lines without sorting parts made in different forging dies, nor is it necessary to sort them for assembly. Work is delivered from last Greenlee on conveyor, at the end of which an automatic loader will feed the indexing table. From here rods are fed into Toledo scale which sets cutters in the Motch & Merryweather mill. Second index loads and unloads the mill

# PONTIAC

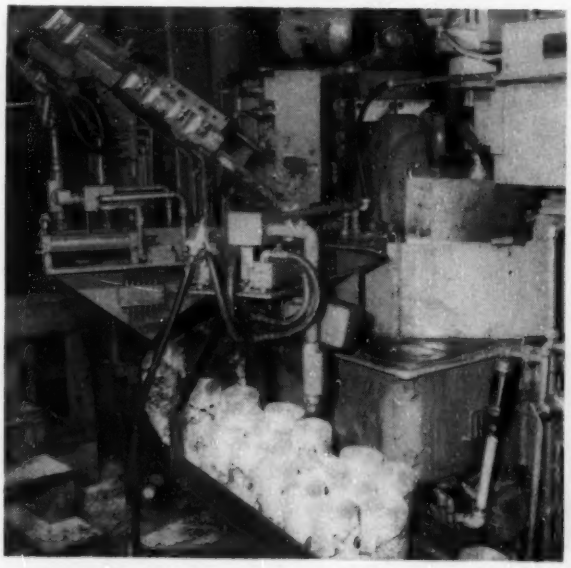
## Piston line also automatic

**Completely automatic handling of "silpper-type" pistons is another innovation in auto-engine production. In this line, both high- and low-compression pistons are run through the majority of operations together and are automatically sorted later for individual processing. Automatic loading, unloading and transfer between machines keeps the pistons moving without manual handling. Inspection is automatic too, and is performed at frequent intervals to prevent loading the line with rejects. This consideration is especially important because the line was set up to produce approximately 200 pistons per hour**

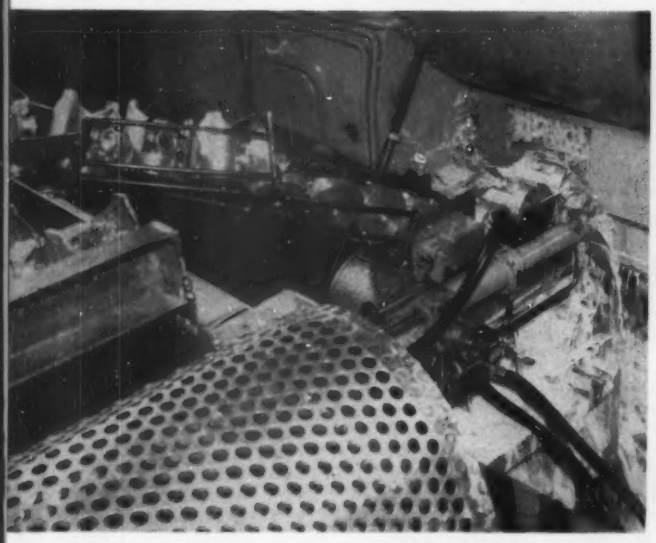



**FIRST AUTOMATIC PISTON LINE** in the industry begins with Hoern & Dilts rotary machines modified by Pontiac engineers to spotface and center head, groove and chamfer pin holes, mill weight pads, then drill and ream two 5/16-in.-dia holes in rough-turned castings from the foundry. Pistons are then conveyed to, and automatically loaded into, a battery of three 6-in., 8-spindle Acme-Gridley automatics for facing the heads, rough and finish turning ring grooves, turning lands and skirts, cutting skirts to length, slotting and chamfering. An automatic Sheffield machine checks each of these chucking operations before the pistons are transferred to a battery of Buhr machines for drilling smoke and oil holes. Another automatic inspection follows. Here, pistons are also sorted so subsequent operations are performed on both high- and low-compression types.

Special Landis piston grinders are next employed for elliptical grinding, after which the pistons are again inspected automatically and the high-compression pistons loaded into Morris mills where they are machined to a specified weight, the heads of low-compression pistons being end milled in other Morris machines before entering the weight mills. Automatic tin plating follows, then pin holes are finish-bored in special Ex-Cell-O machines. Last operations are washing and an automatic temperature control where pistons are transferred through a tunnel for a specified length of time at 72 F, then into a temperature-controlled room for automatic final inspection

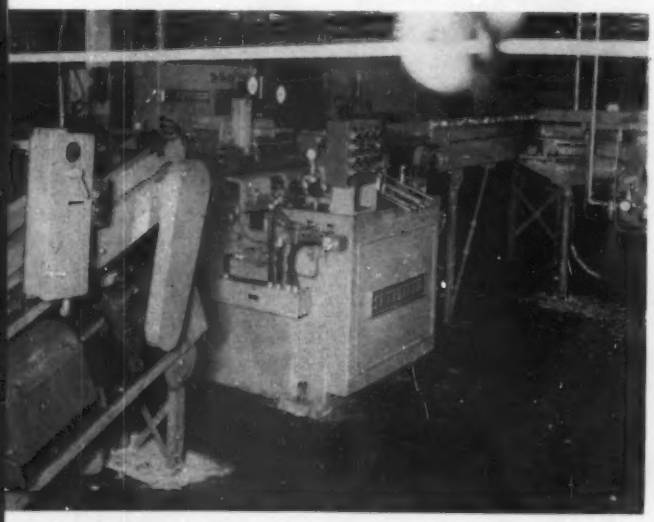


**ROUGH-TURNED CASTINGS** are loaded into this 8-station Hoern & Dilts rotary machine for initial machining operations on piston line. One operator runs two machines which are automatically loaded and unloaded. Two parts are processed at a time in each machine. Air-actuated fixtures locate and clamp pistons for indexing from one head to another. First operation is to mill weight pads, the second, to core-drill pin holes, then two 5/16-in.-dia holes are drilled in the weight pad. Fourth index takes work to a head where these holes are reamed; the next mills a retainer ring groove in the pin hole. Last operation is to chamfer pin hole top and bottom. At unloading station, pistons are directed into chutes that carry them to belt conveyor for transfer to 8-spindle automatics

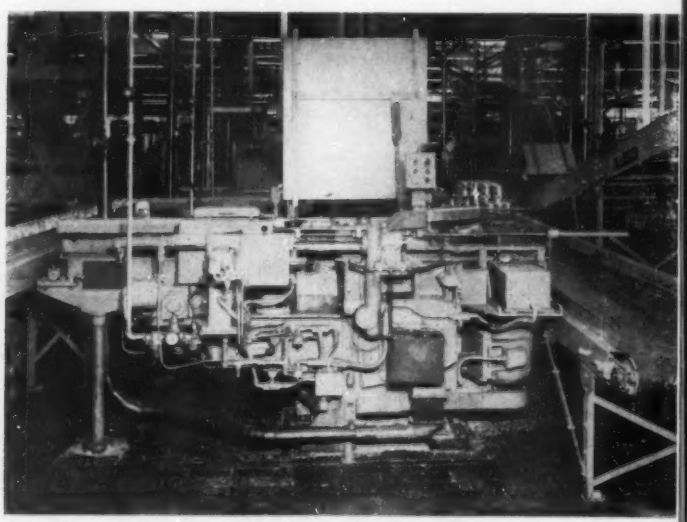


**PISTONS ARE AUTOMATICALLY LOADED** into Acme-Gridley automatics where complete turning operations are performed on head, grooves, lands, and skirts. Parts are automatically unloaded in a chute under the one shown for transfer by 2-deck conveyor to automatic inspection which includes gaging width and dia of grooves, lands and dia of skirt. Rejects are easily traced back to machine which produced them so that tooling or other corrections are made immediately. Automatic ejection from the inspection setup places good parts into single-deck conveyor for transfer to battery of drilling machines

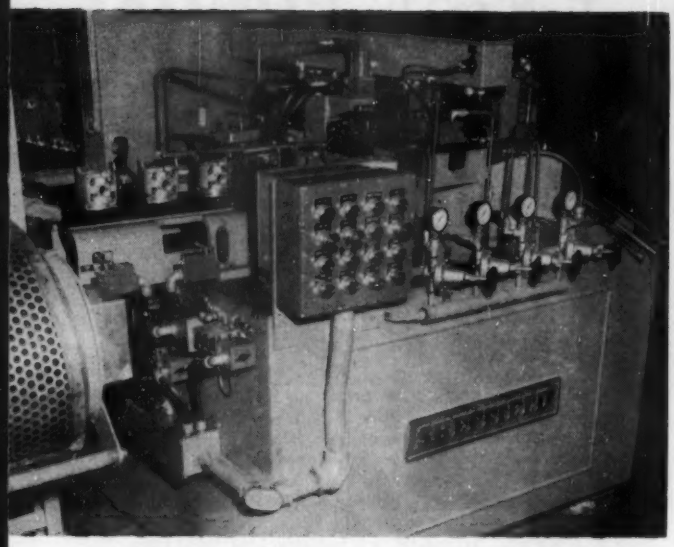
**DRILLIING SMOKE AND OIL HOLES** is accomplished in special Buhr machines to which parts are delivered by the inside track of the conveyor shown. After drilling, the machines automatically eject pistons into chutes on which they are carried to the outside track for transfer to inspection. Three Buhr machines each have 4 angular and 8 horizontal heads; all contain HSS drills



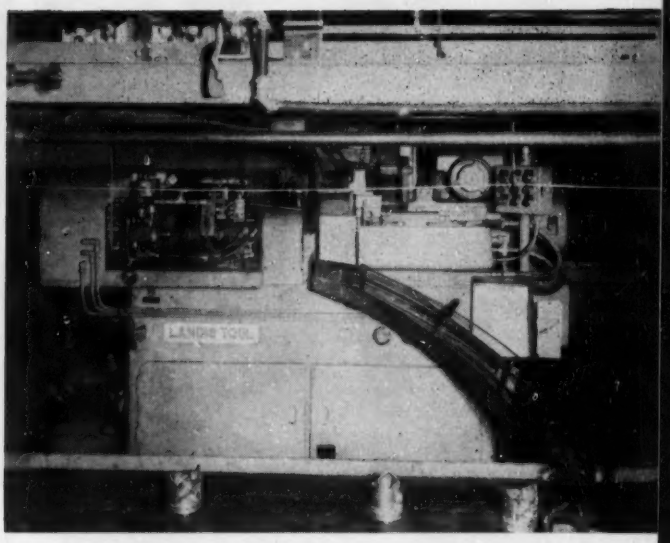
**CHECKING AND SORTING** is automatic after piston skirts are ground. Pistons are picked up from the bottom of a 3-deck conveyor by a Rapistan flight conveyor and automatically loaded into a Sheffield machine where go, no-go gages check skirts. Out-of-limit pistons are automatically ejected, the rest are sorted to produce high- and low-compression pistons. Those to be made into the high-compression type are automatically ejected into a single-deck conveyor for transfer to Morris weight mills. Others are directed to Morris end-milling machines for milling heads before entering weight mills



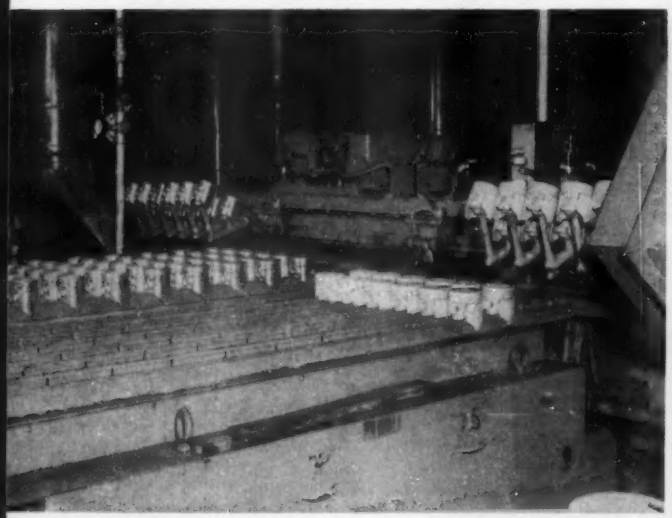
**ALL PISTONS ARE AUTOMATICALLY WEIGHED,** milled, and weighed again to meet specifications in this special Morris machine. Work is loaded at left on chain conveyor in machine which carries it to a turn over fixture where pistons are positioned on skirt end. Toledo scale then weighs parts and automatically sets the machine for removing amount of stock necessary to obtain desired weight. After milling, a second Toledo scale checks weights and automatically stops the machine if parts are outside preset limits. Pistons are unloaded into conveyor at right for transfer to tin-plating setup.



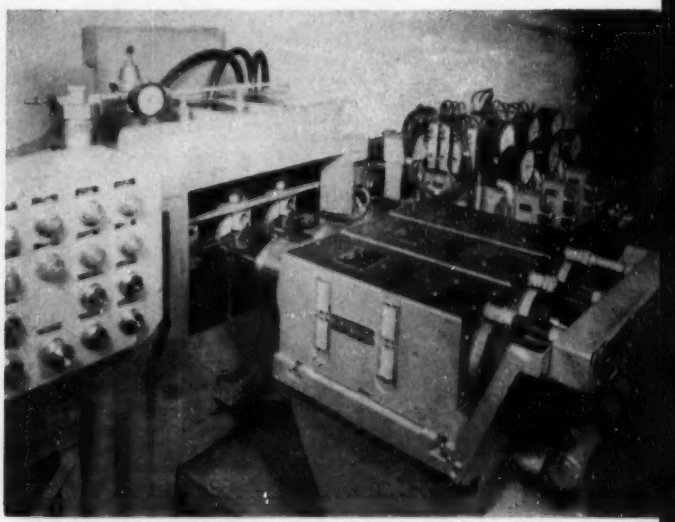
**AUTOMATIC INSPECTION** after drilling pistons insures that all oil and smoke holes have been produced. Probes enter holes in oil grooves and check their location as well as the presence of broken drills, if any. Oil holes in pin bosses are checked by means of orifices that register specific amount of air escapement when holes are there and correctly located, orifices actuate automatic rejection when holes are missing. This setup also automatically indicates the machine in which rejects are made, and automatically loads good parts into a 3-deck conveyor for transfer to grinding operations. Rejects are loaded in a chute for examination by a job setter who is warned of rejects by a system of lights



**AUTOMATIC LOADING** into Landis grinders follows inspection of drilled pistons. A 3-deck conveyor employed between the Sheffield machine and these grinders has a top deck which provides storage area while a second delivers pistons to grinders. In these special automatic piston grinders, previously turned skirts are ground elliptical and tapered, after which work is unloaded automatically

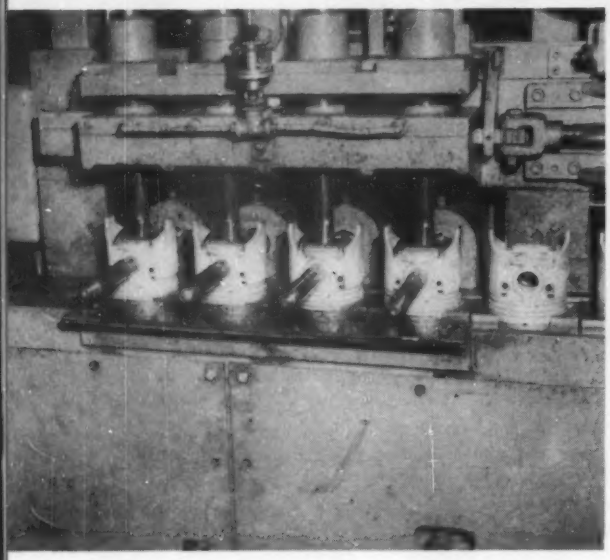


**PICKUP AND DELIVERY** of pistons is fast and efficient in this automatic Stevens tin-plating setup. Parts are loaded from flight conveyor into guide rails at left, positioned correctly for pickup arm in plating machine which carries 12 at a time through successive baths. After soaking clean for about 50 sec, pistons are rinsed in cold water for 47 sec, immersed in nitric acid for another 47 sec. A second cold-water rinse follows, after which a tin immersion is made for about 5 min. Cold and warm water rinses are followed by blowing piston dry and automatic ejection into guide rails at right. Numerous small tanks instead of a large one simplifies cleaning and reduces volume of solution



**FINISH-BORING PIN HOLES** follows tin plating and is performed in a battery of 4 special Ex-Cell-O single-end, 3-spindle machines. Pistons leave plating setup via a flight conveyor that unloads into a single-deck overhead conveyor from which they are wiped off into rows of 3, skirt down, for automatic loading into boring machines. A transfer bar indexes and aligns parts with spindles which are mounted on ways, while hydraulic fixtures locate and clamp inside of piston heads. Built in Sheffield gage checks finished bore sizes, shuts machine off if pistons are outside preset limits. Bores are held within 0.0001 in. out of round and within 0.0002 in for taper. Parts are automatically unloaded into a conveyor for transfer to bearingizing operation

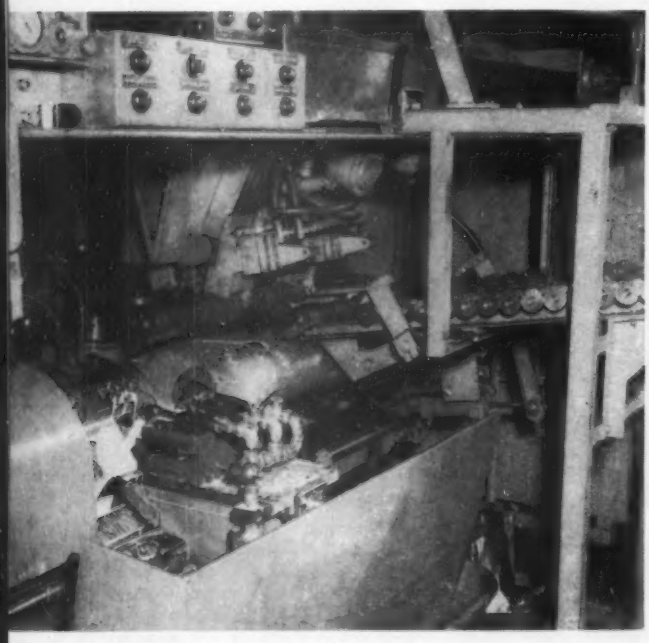
**Piston line** ... continued



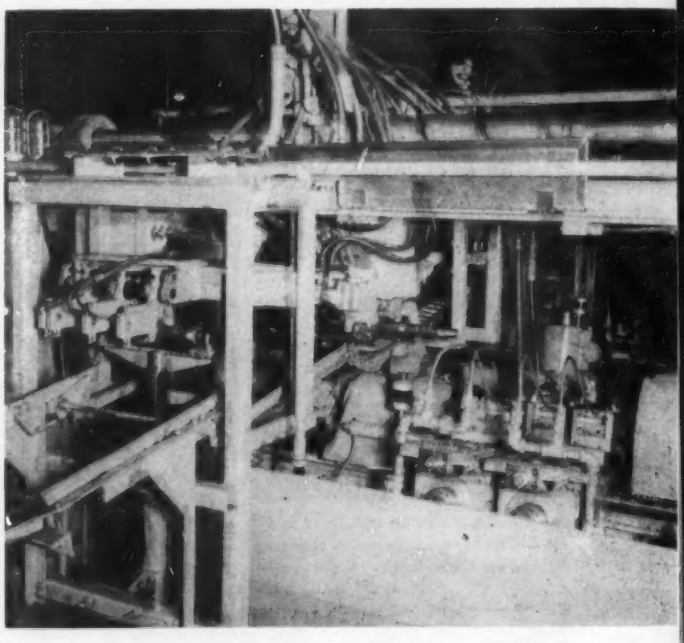
**FOUR AT A TIME** is capacity of this special Hesco bearingizer. Here, pin holes are finished to 12 mu in. rms. After bearingizing, parts are automatically unloaded and transferred to automatic washing, then weighed and automatically inspected, sorted and stamped with pin-hole size and skirt dia. Belt conveyors carry finished work to storage, sorted according to size

# PONTIAC Camshaft

**SPECIAL MACHINES AND AUTOMATION** are employed throughout the camshaft line to process parts with a minimum of manual handling. Work begins in Lo-Swing lathes (after centering) where shafts are turned, then automatically ejected after automatic gaging. Tracks feed a Buhr drilling machine where all holes are produced. Camshafts are then loaded into tracks that carry them to a battery of 3 straighteners, after which they are loaded into racks on a monorail for transfer to a Lo-Swing lathe for re-centering. Monorails transfer them to Landis multi-wheel and angular-wheel grinders for grinding bearings, sprocket dias and thrust faces. Rough and finish grinding the cams follows an inspection, the work being transferred here, too, by monorails through 28 Landis cam grinders. A Lees-Bradner rotary hobber is next employed to produce gear teeth at one end, after which the teeth are hardened in an automatic Cincinnati flame hardener. Washing, straightening, if necessary, inspection, Lubriting, polishing and a final wash complete the process

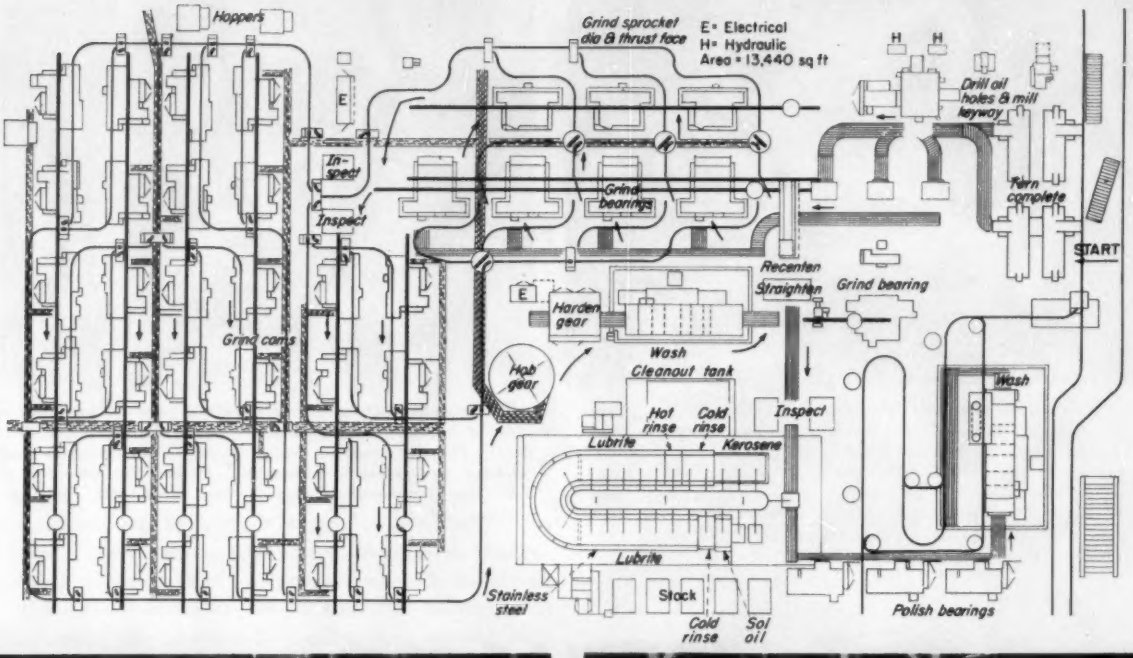


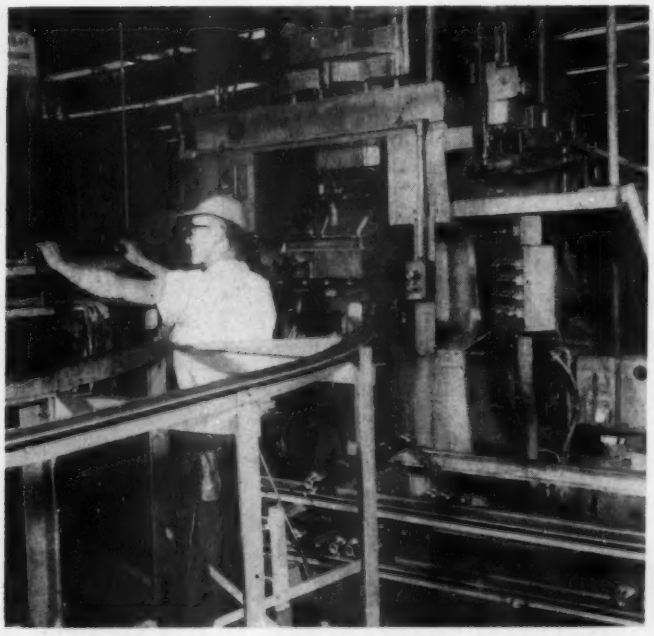
**AUTOMATIC LOADING**, machining, and unloading are accomplished in 4 Lo-Swing lathes where camshafts are completely turned. Here one of two load fingers removes a camshaft from the loading rack, carries it to the tool area where it is located and clamped between centers for machining. Second load finger removed finished work and transfers it to automatic gaging device, thence to the unloading station. Details of this machine were described in *AM* for Mar 29 '54



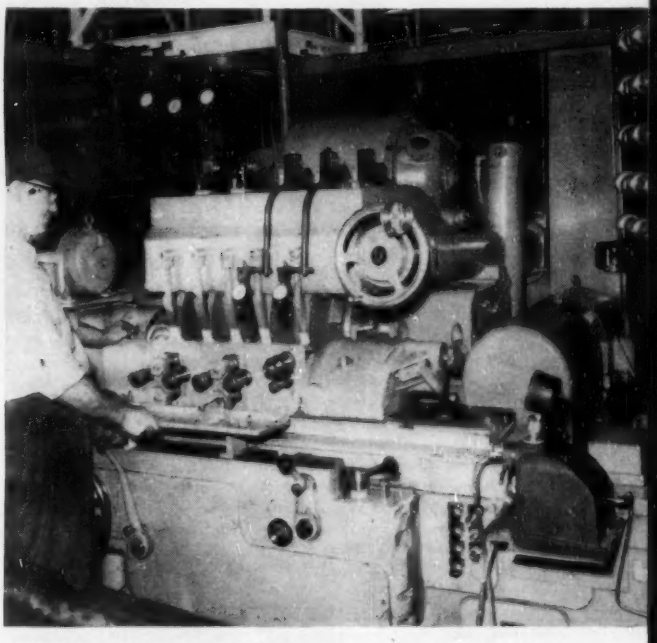
# production up 25%

**A carefully planned arrangement of machines, specially designed for processing camshafts, provides high production rates. Monorails, conveyors, and loading racks provide a high degree of automatic handling as work is moved from lathes, drilling machines, straighteners and grinders through hobbing, flame hardening, washing, Lubriting, and polishing. 13,440 sq ft are devoted to this work.**



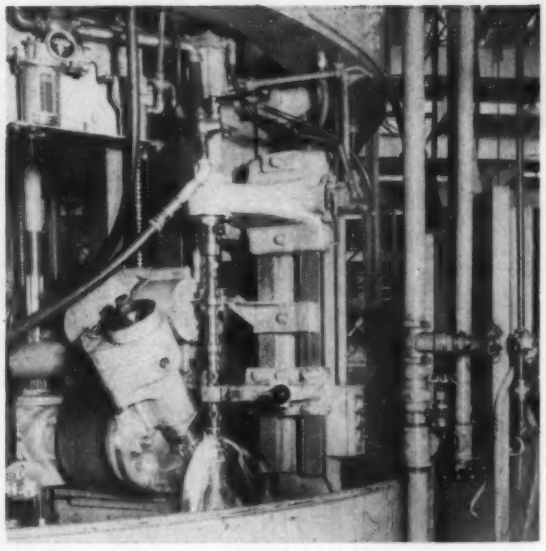



**MANUALLY LOADED** Buhr rotary-transfer machine is fed camshafts from track after they leave Lo-Swing lathes. This 8-station machine has side and rear heads as well as a trunnion type fixture, permits drilling, tapping, and chamfering all holes as well as milling a keyway. Work is unloaded into more racks for gravity feed to Impco straighteners



**CAMSHAFT BEARINGS ARE GROUND** in a battery of 4 Landis multi-wheel grinders. Work is carried from re-centering operation on monorails, delivered in the same way to more Landis machines for grinding sprocket dia and thrust faces. Cycle here is completely automatic; one operator attends two machines principally for loading, unloading and checking

**LANDIS ANGULAR-WHEEL GRINDERS** are employed for grinding camshaft sprocket dias and thrust faces. Diamond-wheel dresser automatically trues wheel face after grinding a pre-set number of pieces. Here, too, cycling is automatic and the operator confines most of his attention to checking the work, loading, and unloading. Camshafts are conveyed from here to a battery of 28 cam grinders by monorail conveyors

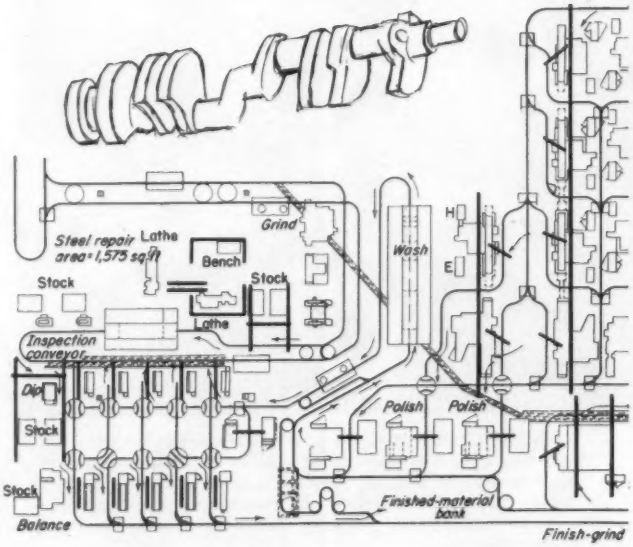


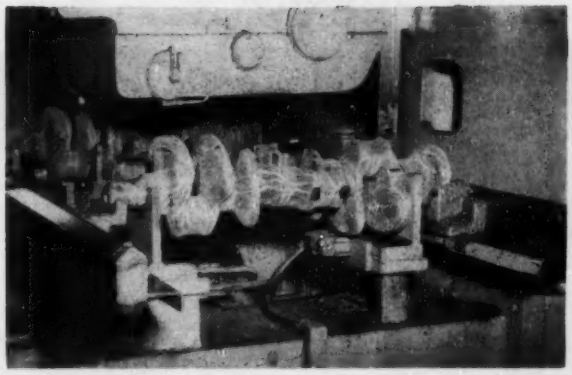
**CUTTING GEAR TEETH** and hardening the teeth on camshafts is done on a Lees-Bradner 6-station rotary machine and a Cincinnati Flamatic machine. Work is carried between the two machines by monorails, is manually loaded and unloaded at both, then transferred through washer, straightener, inspection, lubriting and polishing

# PONTIAC

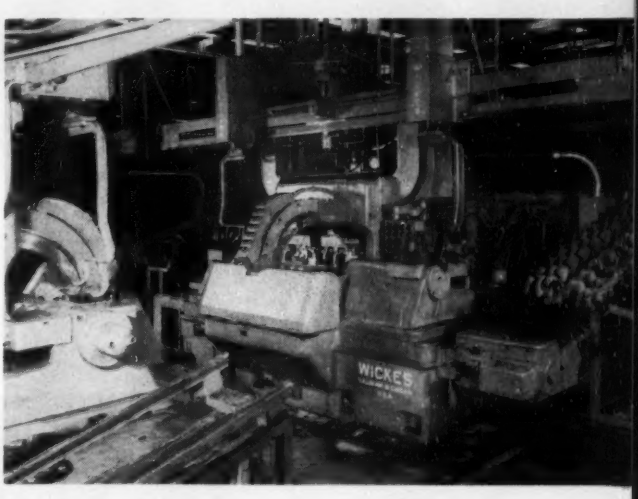
## Automatic crankshaft line

**NEARLY 32,000 SQ FT OF AREA** is taken up by automation for crankshaft production. Lines begin with special Sundstrand milling machines where forgings are centered and locating notches are milled before bearings are turned in Wickes center-drive lathes. Bearings are then rough-ground in Landis machines, after which crankshafts are straightened, pins are rough and finish turned, oil holes are drilled and counterweights are turned. Another straightening operation follows, then a number of grinding operations including grinding bearing thrust faces, oil-seal and pilot-bearing dias, and sprocket dias and shoulders. The crankshafts are then drilled, reamed, tapped, and a keyway milled in special Baker machines, they are balanced, the pilot bearing hole is bored, and a flange is faced in Ex-Cell-O precision-boring machines. A battery of 17 Landis pin grinders is then employed, after which Impco polishers chamfer oil holes and polish thrust walls and bearing dias. Final operations are wash, inspect, and straighten again, if necessary. With few exceptions, crankshafts are automatically loaded and unloaded at these machines and a variety of conveyors are used throughout the line for banking and storage as well as automatic transfer between machines. Five Sheffield gaging machines throughout the line check all bearing dias, locations, etc, to insure accuracy as work progresses



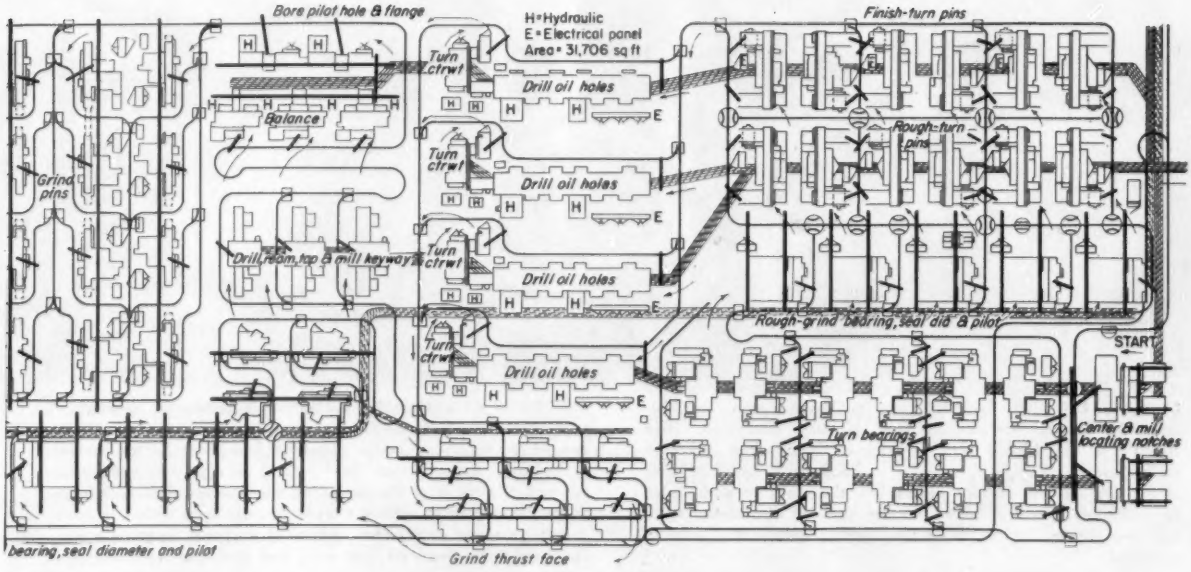


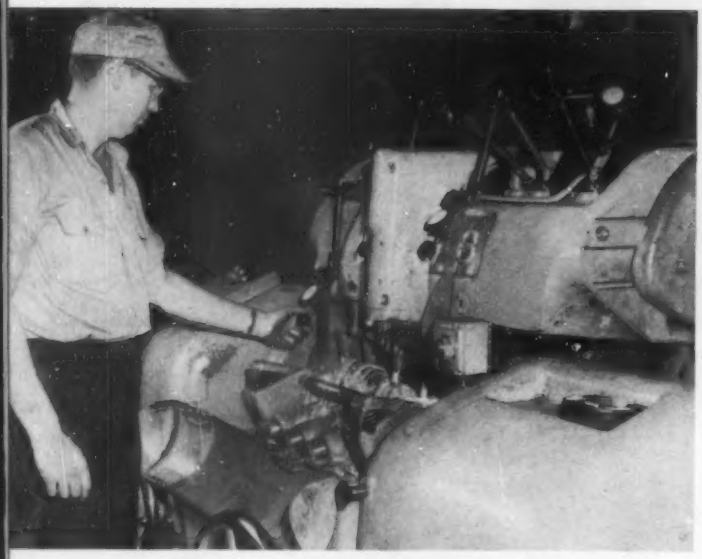
**AUTOMATIC UNLOADER** in special Sundstrand milling machine transfers crankshafts out of machine after centers are drilled at each end and locating notches are produced. Cycle is automatic after rough forgings are loaded, crankshaft is automatically picked up and placed in fixture at center-drill position, then, after drilling, automatically indexed to milling station after which it is lowered to unloading position. One operator attends more than one of these machines in which the cycle is fast enough to permit continuous production in 12 center-drive lathes



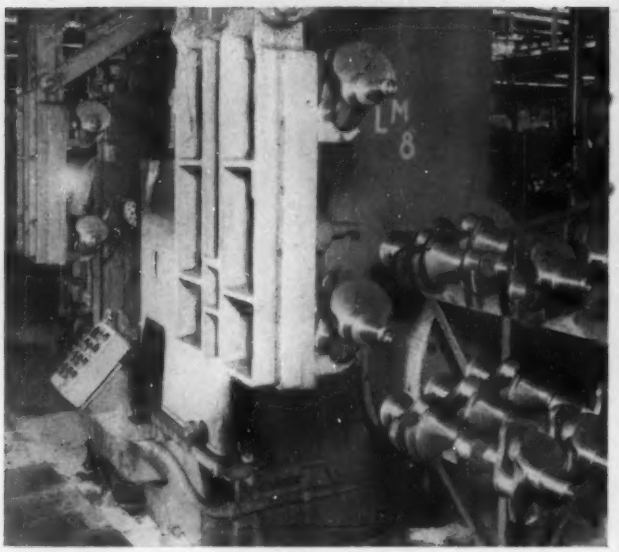

**ONE OPERATOR HANDLES SEVERAL** of these Wickes center-drive lathes where crankshaft bearing dias are turned. Battery of 12 machines is arranged in facing pairs, permitting an operator to check work, make occasional tool changes and generally supervise the operation. Machines are automatically loaded and unloaded, and power and free conveyors transfer finished work to rough grinding

**Automation in crankshaft lines is complicated by the need to maintain nearly perfect balance in the finished product. Here, progressive operations—almost entirely automatic as far as handling, loading, and unloading are concerned—require close control over positioning and locating. After numerous machining operations in which tolerances are held to close limits, crankshafts are finally balanced to within 0.250 oz-in. of a set zero level by automatically drilling away a predetermined amount of stock from indicated positions in counterweights at each end**

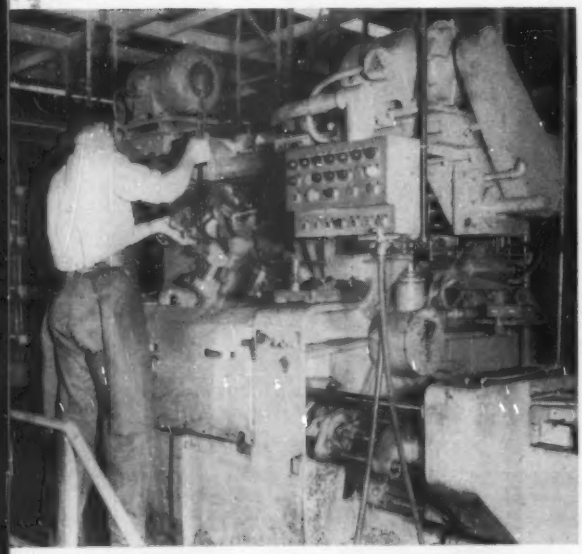




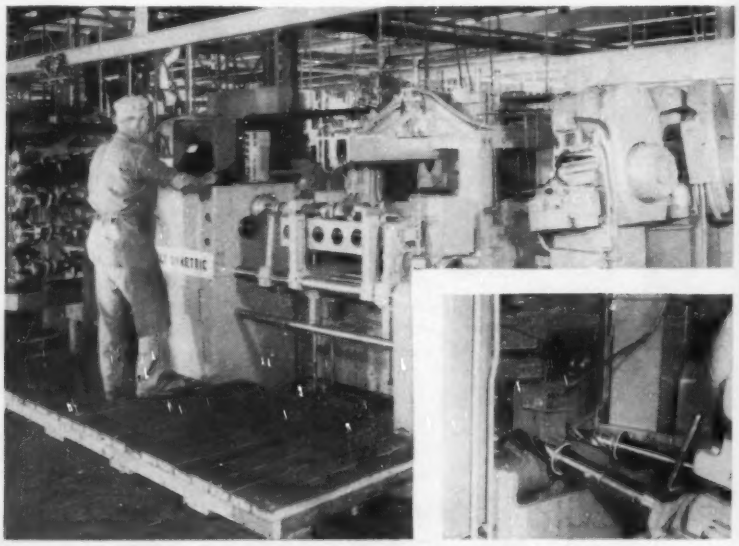
**MONORAILS WITH WORK RACKS** carry crankshafts to battery of 5 Landis multi-wheel machines for rough grinding all line-bearing dias, oil-seal and pilot-bearing dias. Dial indicator fixtures with pivoting arms permit dimensions to be checked as work progresses. Here, manual loading and unloading are more practical than automatic because of the nature of the operation and time required. Before transfer to turning operations, rough-ground crankshafts are straightened in a special Impco machine



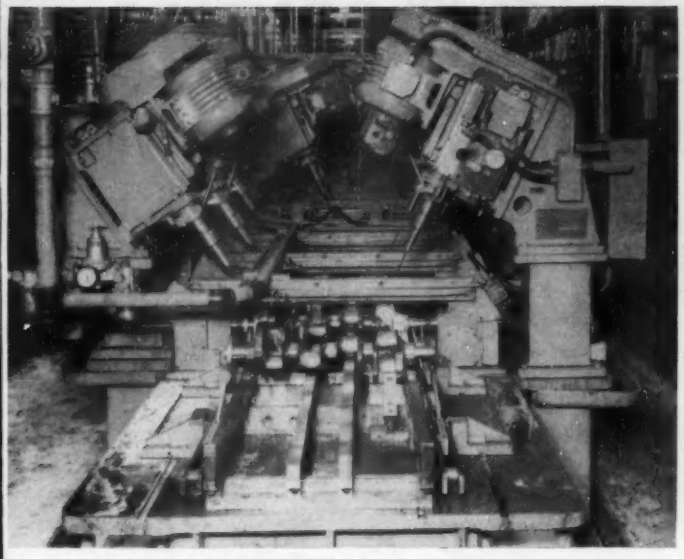

**TURNING CRANKSHAFT PINS** is done, 2 at a time, in these special 2-spindle LeBlond lathes which automatically pick up and load work from inclined racks. Six machines in a battery of 12 are used for rough turning, the other 6 for finishing to obtain uniformity for subsequent grinding. One operator handles several machines, checks work and changes tools. Automatic unloading into racks simplifies transfer from roughing to finishing lathes and from these to similar racks from which work is loaded into free rail conveyor for transfer to drilling line



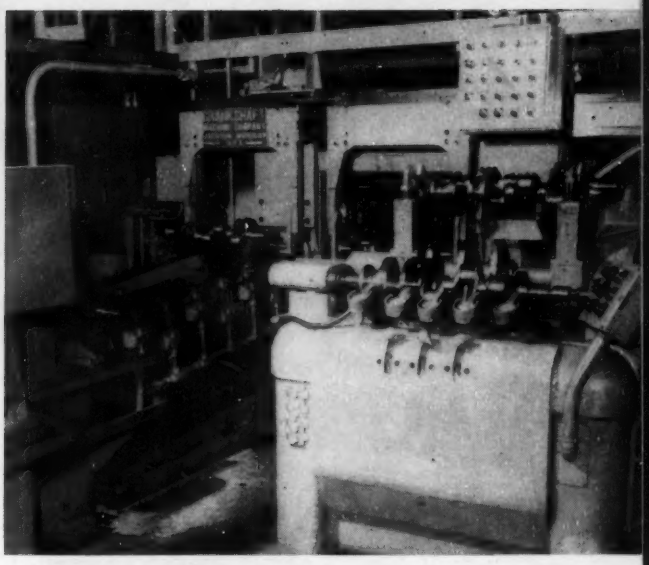
**DRILLING, REAMING, TAPPING** and milling keyways in Baker machines follows straightening and grinding operations. Here crankshafts are loaded into a trunnion fixture from monorail racks, indexed through 10 stations. A head on a hydraulic slide in the rear of the machine moves into the work at each index for milling the keyway. Depth of holes, sprocket dia, broken tools, etc, are checked at an inspection station before the work is unloaded



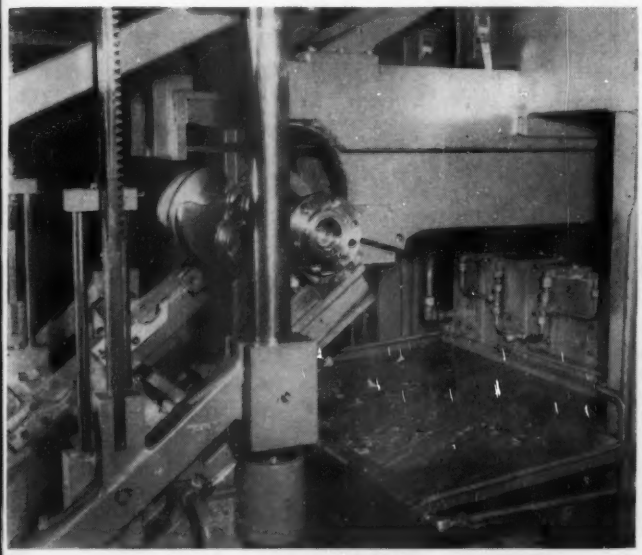
**AUTOMATIC CRANKSHAFT BALANCING** is done "by component" in Gisholt machines which determine the amount of stock to remove for balancing vector forces on both sides of the vertical centerline of the crankshaft. Four drills, 2 on each side, enter work to remove stock from the center of the counterweight and leave a specific amount to achieve 8 oz-in. of unbalance within ¼ oz-in. Selsyn generator and motor, controlled at panel, operate a cam for determining depth of drill entry and thus stock removal



**AUTOMATIC DRILLING** in Krueger-Barnes transfer machines produces oil holes from main to pin bearings, metering holes in pin bearings and holes in flanges, 16 in all. Four transfer machines each have 17 heads, HSS drills. Crankshafts are transferred from one station to the next for hydraulic clamping and locating in positions relative to drill angles. Holes are drilled progressively to reduce tool wear, first drills enter work a specific depth, while subsequent drills follow through. An inspection station just before automatic unloading employs air pressure to determine whether or not holes have been drilled through and to locate broken drills, has a light panel to indicate station at which trouble occurs



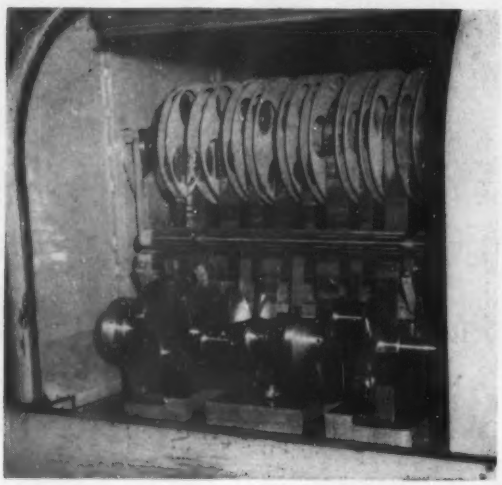
**LOADING, MACHINING AND UNLOADING** is automatic in Crankshaft Machine lathes where crankshaft counterweights are turned on OD and chamfered. Each of these machines is located at the end of four automatic drilling machines left, so work progresses through both operations without interruption. Work is automatically loaded into an inclined shuttle which feeds it to transfer for locating and clamping in the Crankshaft machine. Unloading into an automatic loader in Impco straightening machine, foreground, is accomplished by similar means



**UNLOADING IS AUTOMATIC TOO,** at rear of Dynetric balancing machine, where racks serve as storage system as well as means of removing work. Limit switch arrangement automatically stops machine when racks are loaded with five crankshafts thereby prevents overloading

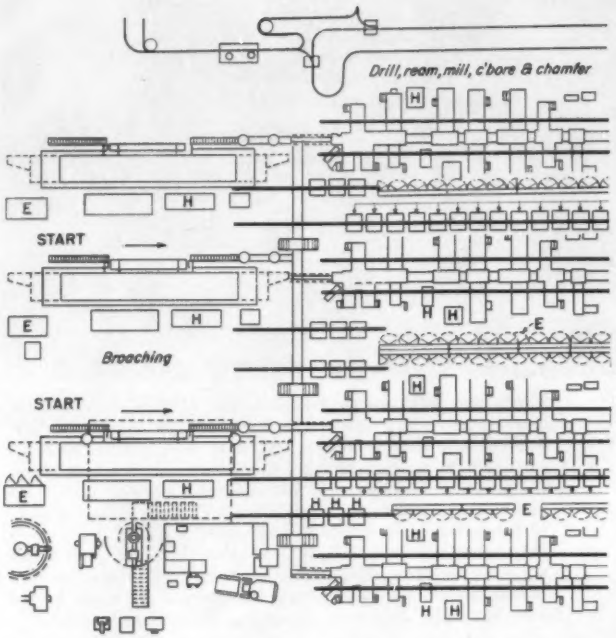
**SIZE CONTROL IN GRINDING PIN BEARINGS** is maintained by 4-column Sheffield gages used in conjunction with Landis grinders. Hydraulic in-feed automatically shuts off when 0.020 in. of grinding stock is removed. A battery of 17 of these machines is fed by monorails which also carry work to subsequent operations

## Crankshaft line . . . continued

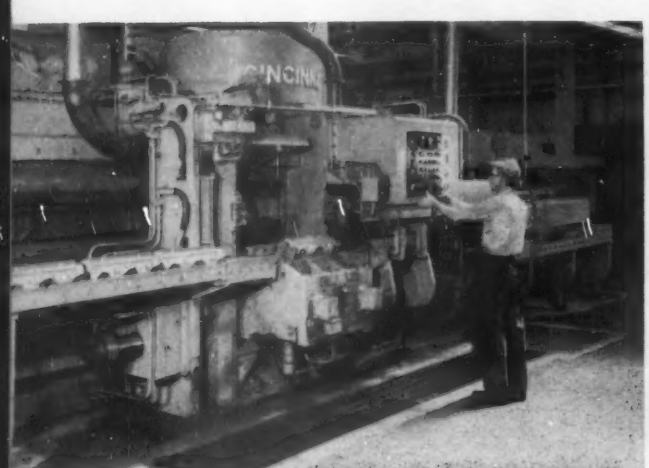


**AMONG FINAL OPERATIONS** on crankshaft line is polishing thrust walls and bearings. Special Impco machines are employed for this work, after which the crankshafts are carried, by monorails, to visual inspection, washing, repair, (if necessary) and final cleaning and inspection

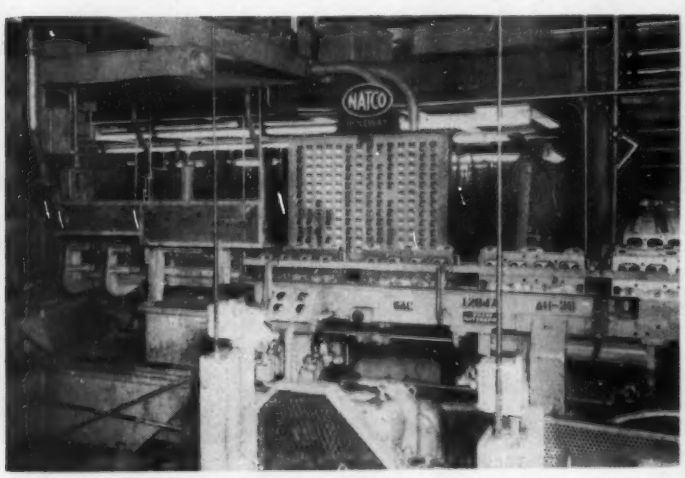
# PONTIAC Four




**PRODUCTION OF CYLINDER HEADS** begins with broaching manifold and connecting faces in 3 huge special Cincinnati machines. Automation moves the work from here through four lines equipped with Natco and WF & John Barnes transfer machines. Two special La-Pointe broaches are fed work from the lines after the transfer



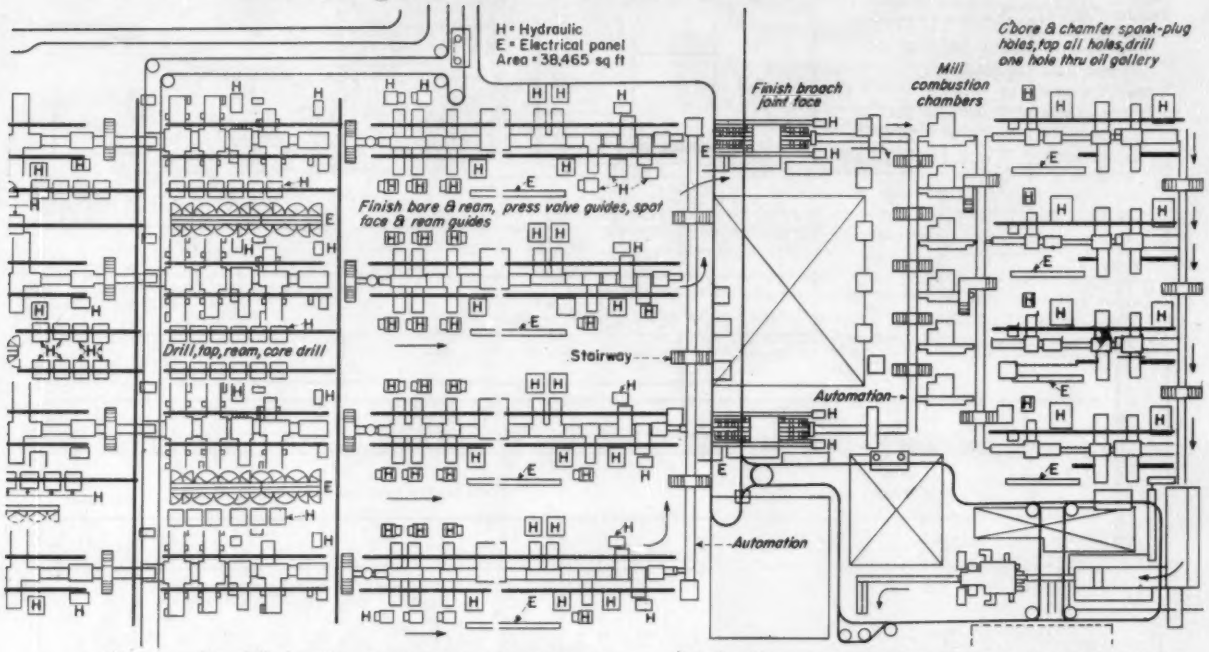
**FIRST OPERATION** on cylinder heads is broaching of exhaust, intake and joint faces in 3 Cincinnati broaching machines where about ⅛ in. of stock is removed from each surface. Work is transferred to loading station where it is hydraulically clamped and located in a pivoting head that swings up and locks in place for the broaching operation, then returns for transfer of work out of machine. Cycle is automatic and provides production rates up to 150 pc per hr



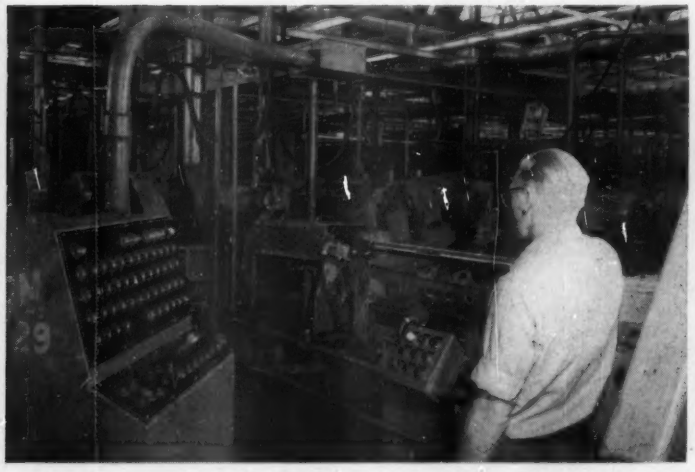

**ALL BOLT, WATER,** valve-guide and dowel holes are drilled, chamfered and reamed in this 21-station Natco machine with both HSS and carbide tools. Spacing of dowel holes is automatically gaged by a Sheffield unit built into the machine—loading and unloading are automatic. First station, shown here, is where ends of cylinder heads are milled. Light panel, in background, indicates positions of all heads, gages and tools in the machine

**Cylinder heads are machined in an area of 38,465 sq ft where four automated lines maintain high production rates. Pontiac process engineers worked closely with suppliers and vendors to be sure all machines meet JIC specifications for electric, hydraulic and pneumatic installations. All details required Pontiac approval, included ok of air cylinders, motors, hydraulic fittings and other small parts as well as the largest equipment**

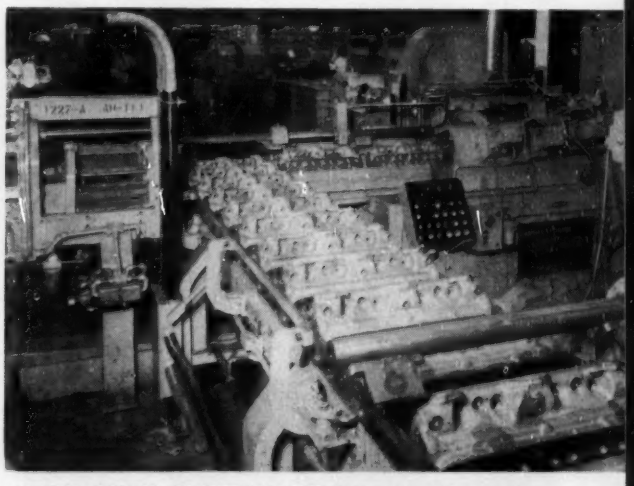
# automated cylinder-head lines


H = Hydraulic
E = Electrical panel
Area = 38,465 sq ft
Drill, tap, ream, core drill
Finish bore & ream, press valve guides, spot face & ream guides
Stairway
Finish broach joint face
Mill combustion chambers
C'bore & chamfer spark-plug holes, tap all holes, drill one hole thru oil gallery
Automation
Automation

machines complete drilling, milling, tapping, reaming and a score of other operations. Automatic inspection follows finish broaching the connecting faces and the heads are then transferred to Cincinnati profile mills for finish-milling combustion chambers. More WF & John Barnes machines are then employed for counterboring and chamfering spark-plug holes, tapping all holes and drilling a hole through the oil gallery. A Centri-Spray washing machine is the next step, after which a special Snyder machine assembles welch plugs and tests the heads for leaks. Hardness testing and final inspection winds up the trip through these lines

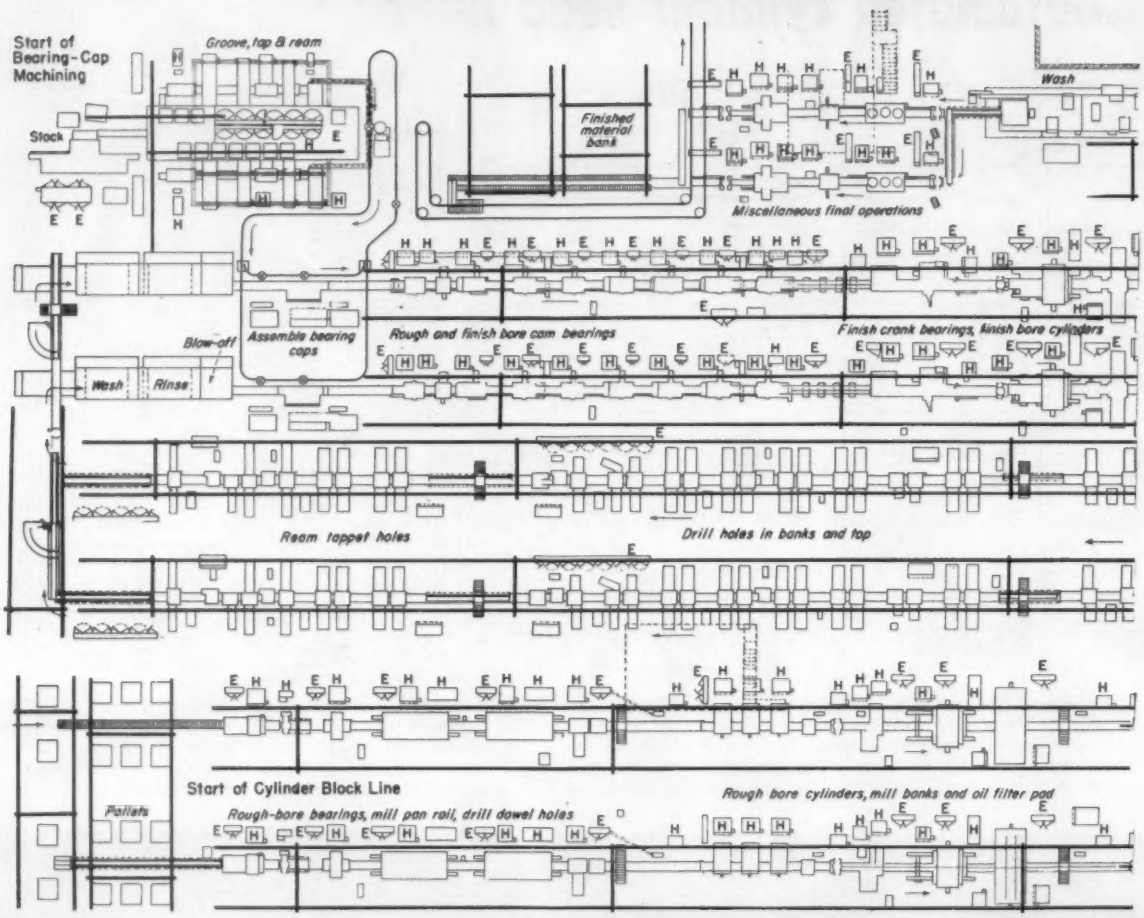


**MULTIPLE OPERATIONS** performed in this 18-station WF & John Barnes machine includes drilling and reaming 8 holes, reaming valve guide holes previously drilled, pressing in valve guide bushings, boring, reaming and burnishing valve stem holes and finishing valve seats. Shown here is loading station to which work is transferred by Wilson automation unit that positions it after it leaves Natco transfer machine

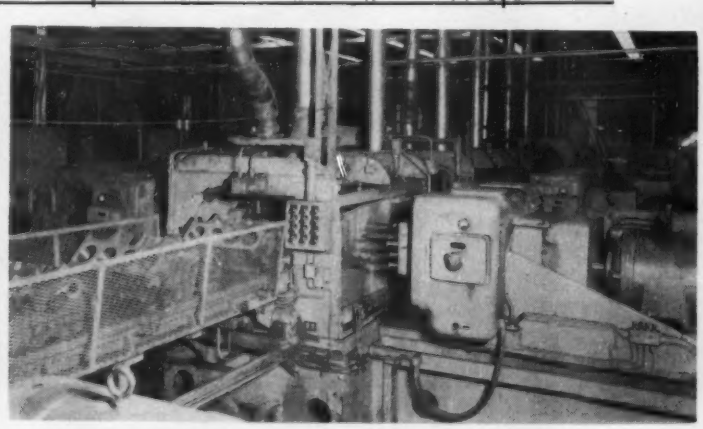


**PROFILE MILLING COMBUSTION CHAMBERS** is performed in a battery of 6 Cincinnati machines. Completely automatic cycling permits high production rates with only occasional checking by jobsetter. Wilson automation units feed and load the machines, transfer work, after milling to 4 WF & John Barnes transfer machines for tapping sparkplug holes and others

# Automated cylinder-block lines

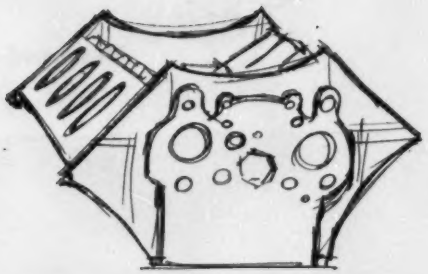


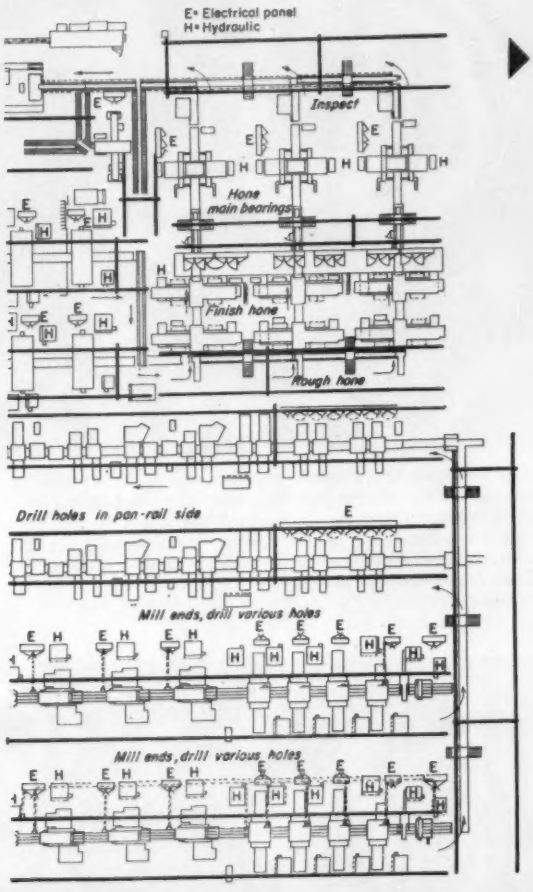
**A 10-STATION INGERSOLL TRANSFER** machine starts cylinder blocks through the line. Here pan rails are rough, semi and finish milled with 11-in. and 13-in. dia carbide-tipped cutters. Prior to this crank bearing and rear cam bearing were rough bored, and following the milling operations, dowel holes are drilled and reamed



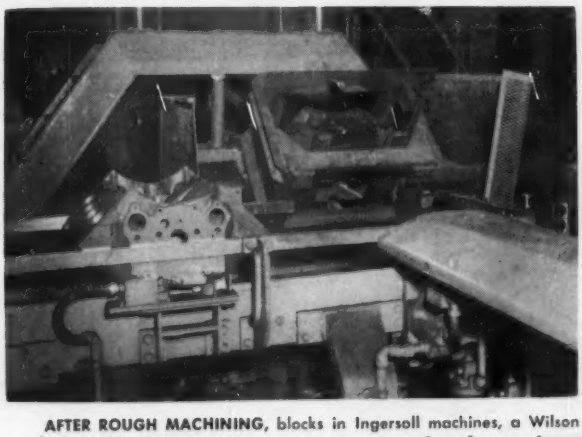
**AUTOMATION UNIT TURNS BLOCKS** 90° after first operations to present ends of blocks to cutters in an 18-station Ingersoll transfer machine where ends are rough, semi and finish milled and all end holes are drilled. Milling cutters are carbide tipped as are many of the drills

**Only supervisory, setup, maintenance, and inspection personnel are required; there is no manual handling. Automatic controls throughout the lines insure constant production regardless of downtime at any particular machine or station. Banking is handled by conveyors adjacent to the main lines to provide automatic storage when one machine or another is overloaded. Two fully automated lines occupy 70,000 sq ft.**

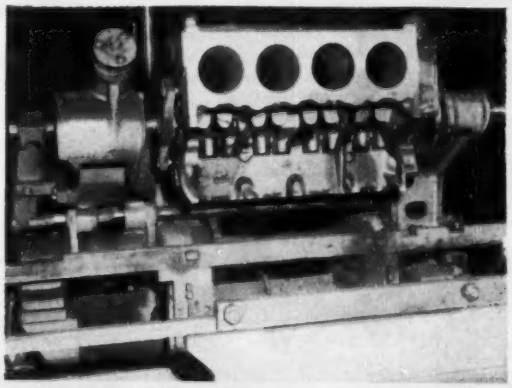


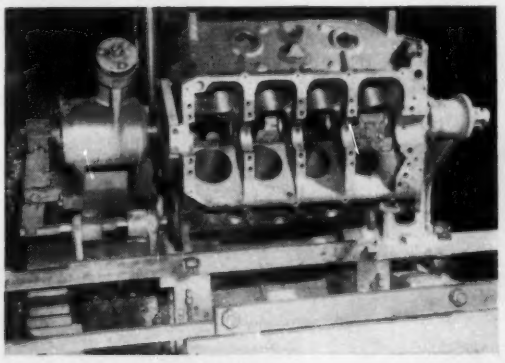



**NEW CYLINDER BLOCK LINES** are laid out in long S-shape and run approx 1300 ft each. Over 30 machines are installed in these two lines (counting each transfer machine as one), each line having 9 transfers in addition to the special machines and automation equipment. Ingersoll and Greenlee transfer machines start the blocks on their way, and, after numerous milling, boring, drilling, reaming, and chamfering operations, blocks are washed in a Centri-Spray machine and bearing caps are assembled in Hautau torque machines. This is followed by rough and finish boring cam and crank bearings and the oil slingers, milling ends of rear bearings, pressing cam bushings and other operations in transfer machines, after which cylinder bores and main bearings are honed in special Micromatic machines. Inspection, washing, assembling welch plugs and removing manufacturing lugs follows, then the blocks are tested for leaks and given final inspection before transfer to engine assembly

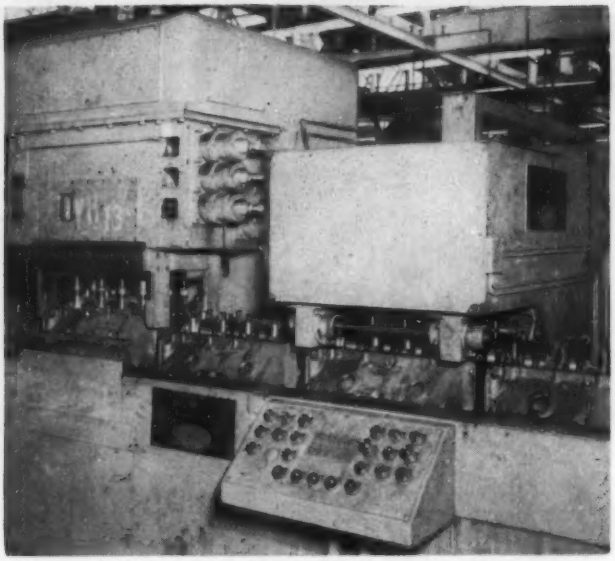


**AFTER ROUGH MACHINING,** blocks in Ingersoll machines, a Wilson turnover fixture positions them with the pan rail up for transfer to the first of 3 Greenlee machines where finish-machining operations are performed. A transfer bar moves the block into the fixture which is then actuated by limit switches to position the part

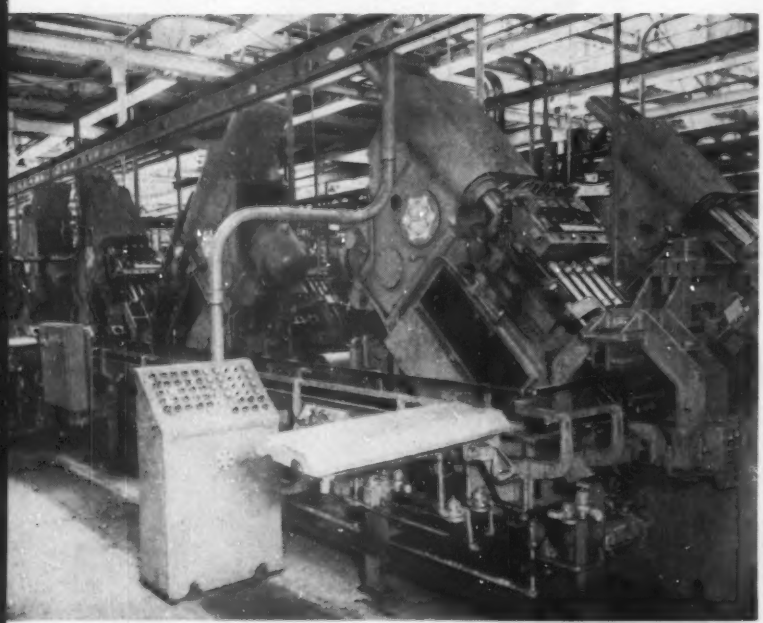


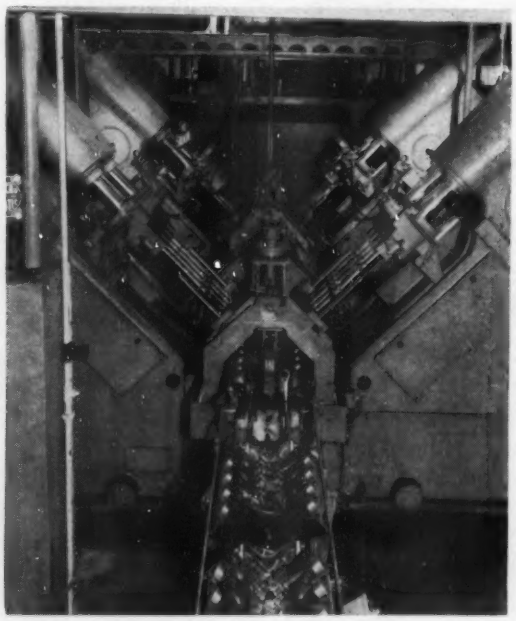


**OTHER AUTOMATION DEVICES** in the cylinder-block lines include this turnover fixture between stations in a 25-station Greenlee machine. Here blocks are turned through 180° in the vertical plane to place the cylinder face up for drilling, reaming, and chamfering after being processed with the pan rail face up. Chips are dumped from blocks into bed conveyor at the same time. Automation fixtures also change positions of blocks by tipping them up on end, rotating them 90 or 180° in the horizontal plane to present one end or another to work-heads, and elevating them as needed

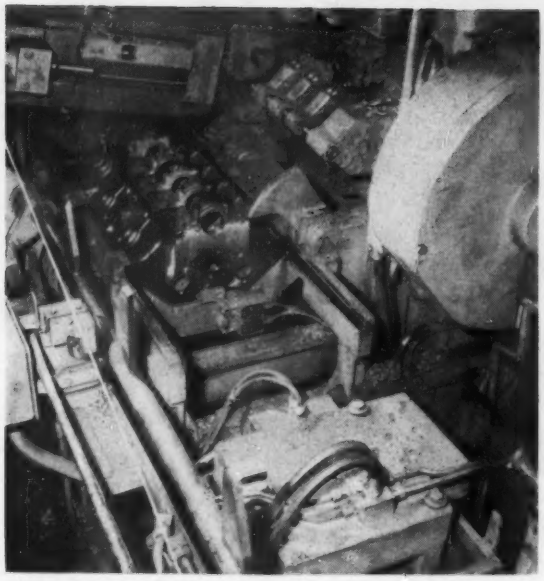


**BEARING-CAP CLUSTERS** start through their own automated lines after having top, sides and joint faces broached in this 20-ton, 60-in. Colonial machine which also rough-machines half-round bearing bore. Cycle is completely automatic and machine unloads work into automation unit for loading of 2 transfer machines. Here the bearing caps are grooved, drilled, reamed, tapped, spot-faced, the locking slots are milled, and the caps separated. Belt conveyors remove the bearing caps from these machines and carry them to monorails for transfer to the block line where they are assembled automatically in special Hautau hydraulic machines. Control over predetermined amount of torque in driving studs insures uniform and accurate assembly

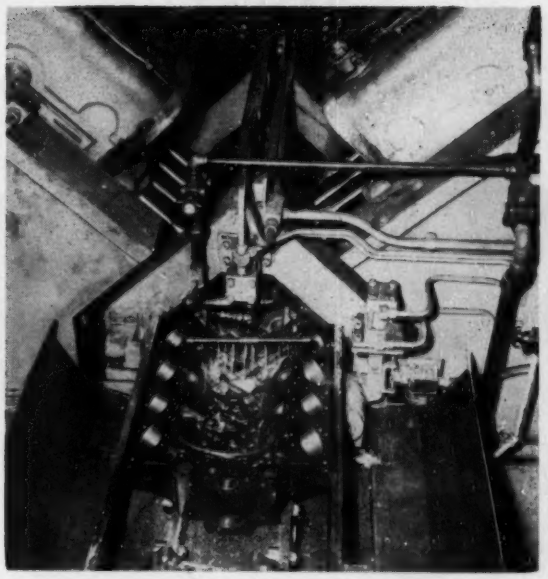




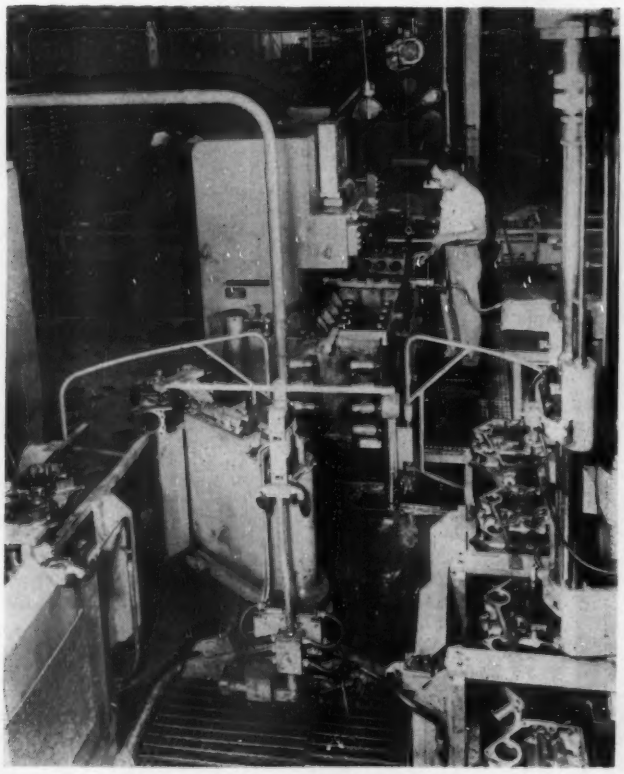
**HONING IS FAST AND AUTOMATIC** in these special Micromatic machines where cylinder bores are rough and finish honed. Work is transferred from Ingersoll machines, where it was finish bored, directly into one of 3 Micromatics for rough honing, then to an adjacent Micromatic for finishing. A special Delpark filtering system is employed for reclaiming honing coolant. A 3200-gal tank with filtering paper receives kerosene coolant after it has passed through a bank of 5 Barnesdrill magnetic separators where chips and metal sludge are removed. Clean coolant is refrigerated to maintain constant temperature of 70 F



**FINISH-BORING** the babbitt liner in cam bearings is done in the third station of a 10-station Ingersoll machine where the crank-bearing bore is also finished. Block is raised and swivelled for positioning against locating pads in upper background where boring heads are also visible. Turnover unit in foreground dumps chips and positions blocks with cylinder face up. Blow-off bar then enters cam holes with air jets contacting oil holes to remove chips



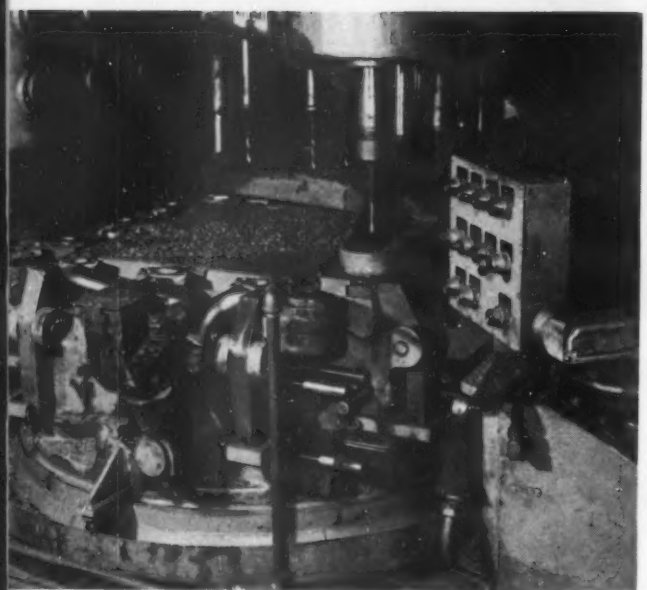
**SEMI AND FINISH BORING** cylinder bores in blocks is done at stations 9 and 10 of this 10-station Ingersoll transfer machine where previous operations included reaming 2 dowel holes in the rear end, (dumping chips) finish milling the banks, inspecting them, and chamfering tops and bottoms of cylinder bores. Kerosene coolant is disposed of into a special 3200-gal settling tank which handles 600 gpm. Retention time in tank is about 5½ min

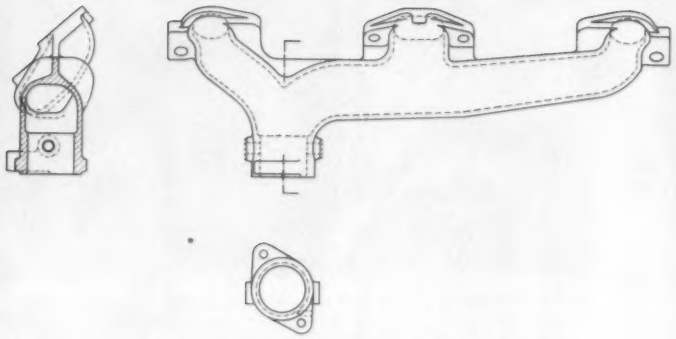


**SPECIAL AUTOMATION EQUIPMENT** is employed with 6 Micromatic hones for finishing main bearings. Blocks are transferred from cylinder-bore honing operations to 3 groups of 2 Micromatics each, arranged in pairs facing each other. After honing bores with oil pan faces down, the blocks are tipped-up on end and picked up by a swinging transfer arm located between a pair of honing machines. This alternately loads one, then the other, after which a similar arm alternately unloads the machines. The second arm also loads a special Sheffield machine where both main bearings and the bores are inspected

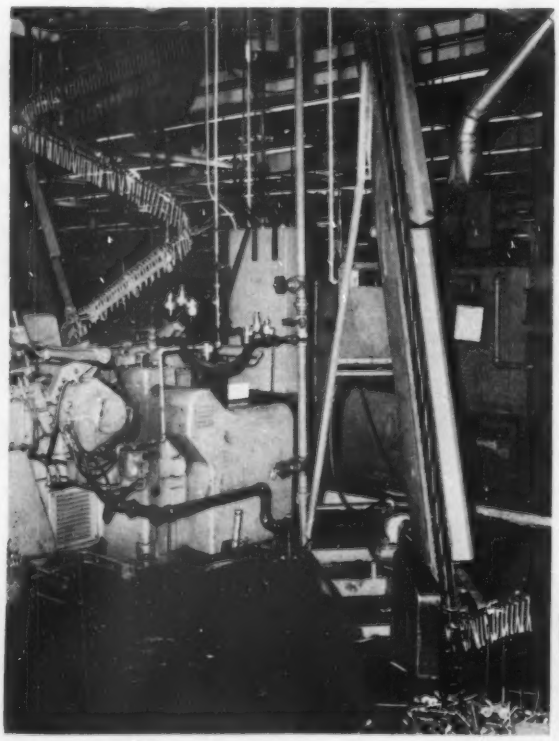
# PONTIAC

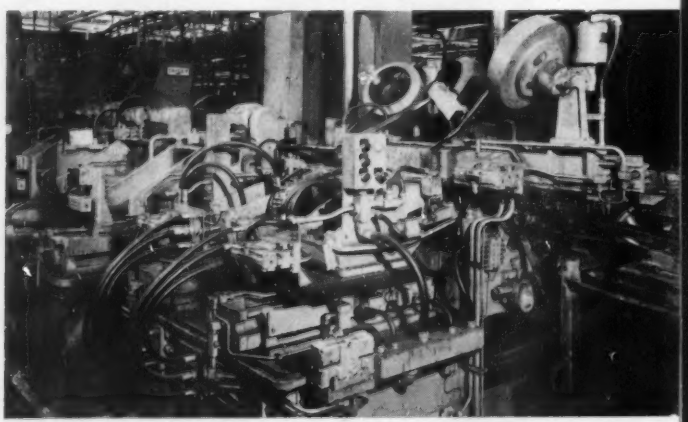
## Typical automatic





**PORT FACES ARE MILLED** and numerous holes drilled and reamed in this special Snyder rotary machine where RH exhaust manifolds start through the automated line. A second Snyder rotary machine, adjacent to this one, handles LH exhaust manifolds. Both rotary machines automatically deliver work to a 19-station Snyder transfer machine for further operations

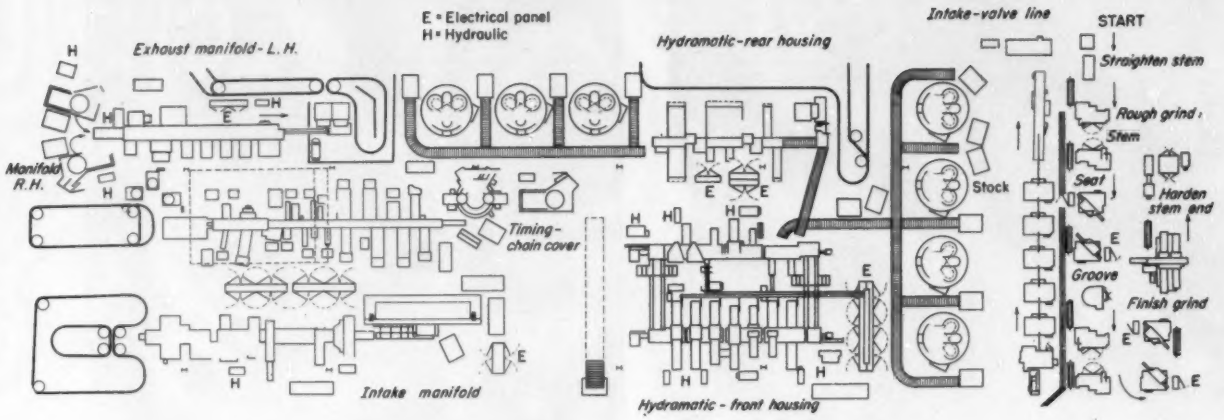




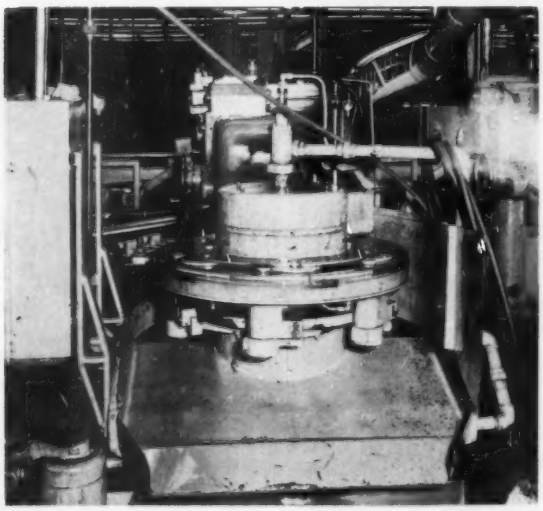
**AUTOMATIC MACHINING** of RH and LH exhaust manifolds is done in this transfer machine where operations include core drilling, tap drilling, reaming, tapping, spot-facing and assembly of bushings. Syntron vibratory loaders feed bushings to station where they are pressed into manifolds, then staked

**SPECIAL CONVEYOR** feeds intake valves for automatically loading 2 Cincinnati centerless grinders for rough-grinding stems. Conveyor itself is automatically loaded by special unit at the base which receives work from gravity-feed track. A control at the top of this conveyor stops loading one grinder when the curved, gravity-feed work track leading to the machine is full

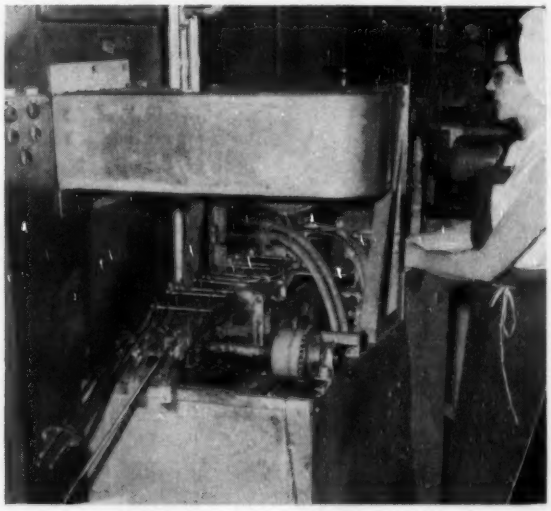
# setups in the parts line



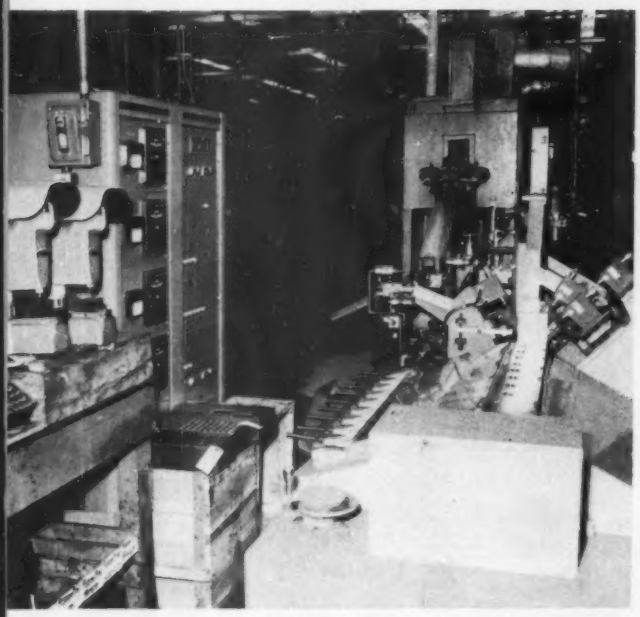

**AUTOMATION FOR MEDIUM** and small parts is as thorough as that provided for large items in the engine plant. An area of nearly 14,000 sq ft contains special Snyder, Baush, and Cross transfer machines among others for machining intake and exhaust manifolds, timing-chain covers and Hydromatic and Syncromesh transmission housings. Another 5000 sq ft of area has been set aside for special machines and automation for intake valves alone. Valves, for example, begin with inspection and straightening of forgings which are then automatically loaded into Cincinnati centerless grinders for rough-grinding the stems. From here they are transferred to Landis valve seat grinders, then to specially designed Ex-Cell-O machines where the stems are grooved and chamfered. Semi-finish grinding the stems and finish grinding the seats follows, after which stems and heads are ground in Gardner grinders. Special equipment designed by Pontiac engineers includes a General Electric induction-hardening machine with power brushes preceding it for burring the heads and stems and hardening the ends of the stems in one setup



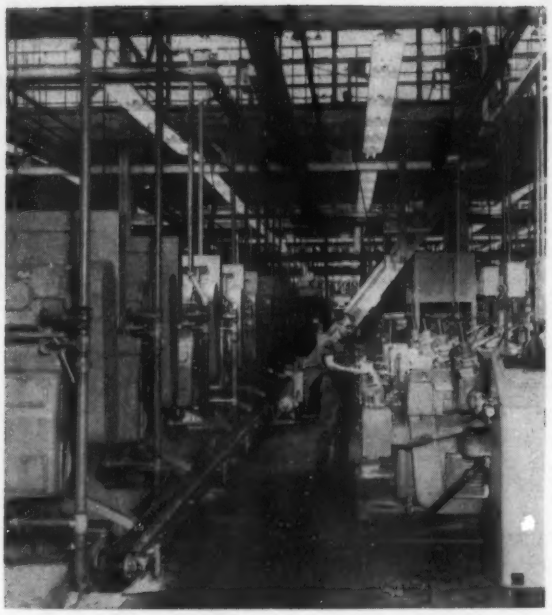
**SPECIAL MACHINES** in the line include this unusual Ex-Cell-O setup where ends of valve stems are grooved and chamfered after seats are rough-ground in Landis machines. Work is automatically loaded into a 6-station rotary table where air cylinders actuate collets for opening and closing. Form tools in heads under the table do the work while collets spin and finished parts are automatically unloaded into track after one revolution of the table. As in other setups in this line, parts are fed automatically to next operation, in this case, semi-finish grinding stems in Cincinnati machines



**AUTOMATIC VALVE HANDLING** is continuous throughout the line by means of these specially designed gravity-feed work tracks and elevators. In this setup, work is loaded into a Gardner grinder for grinding the stems and heads. Track above the machine feeds a loading fixture which transfers the work, through automatic cycling, into the machine for the operation. Finished work is automatically ejected into lower track for loading elevator, left, which carries it to next setup for deburring and hardening



**COMBINED DEBURRING AND HARDENING** is achieved in this unique setup where power brushes, a chain conveyor and an induction-hardening unit are tied together. Intake valves are automatically unloaded from Gardner grinder and directed into power brush end of this unit by chutes. After heads and stems have been deburred, conveyor feeds work to heat-treat head



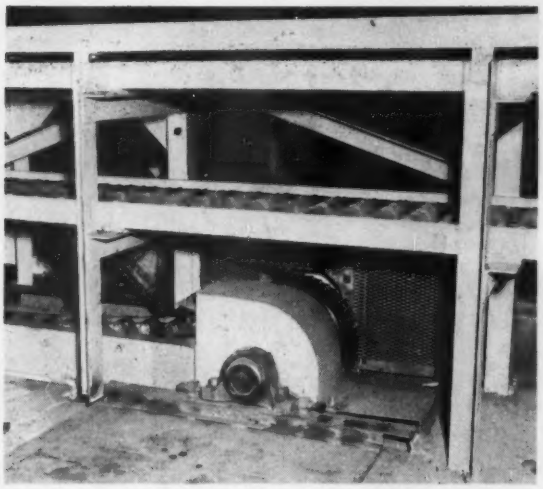
**MANUFACTURING METHODS** for all engine parts have been made as automatic as possible, within practical limits. Rocker-arm ball studs, for example, are turned, drilled and threaded by the thousands in a battery of 10 Acme-Gridley 6-spindle automatics (left) eject parts into a belt conveyor running behind the line. They are scooped out of this conveyor and into a flight conveyor that dumps them into a large overhead hopper that fills a Syntron vibratory hopper. From here they are loaded into a power conveyor that feeds a battery of Cincinnati centerless grinders where the studs are finish-ground to size.

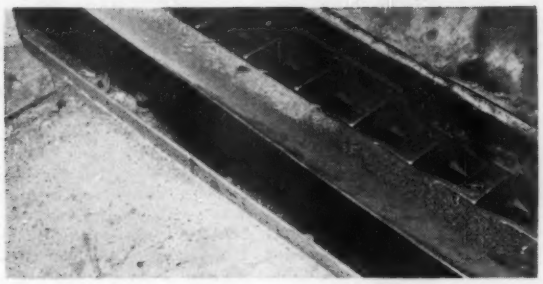
# PONTIAC

## Handling of coolants, chips, and dust

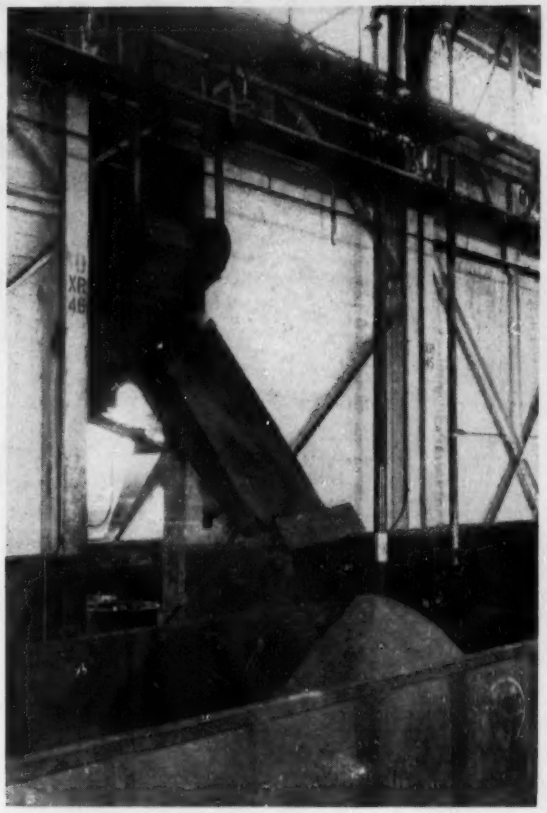
**Plant engineering at Pontiac has had a big job keeping up with large-scale automation and the retooling program as a whole. Vast pits were dug under the engine plant to house 10 sluicing systems, (not including a great many self-contained units at machines where special coolants are employed) and to provide space for chip-settling tanks and crushers. The 10 systems are kept separate (each has its own settling tank), and are employed to handle different types of chips and coolants. Aluminum, for example, is handled by one special system, and CI and steel machinery chips are handled by installations separate from those used for grinding chips.**

**Over 2 miles of sluiceways handle wet chips and compounds, and 4457 ft of conveyors move chips through the plant from machines to their ultimate destination—railway cars that carry them to Pontiac's foundry for briquetting. Dust from transfer machines on the head and block lines and other CI-machining setups is moved at a rate of 360,000 cfm through ductwork over the machines to an 11-ft-dia pipe on the roof which runs nearly the length of the building. Nine Aeroturn collectors outside the building are connected to this pipe and provide a simple means for removal by trucks.**

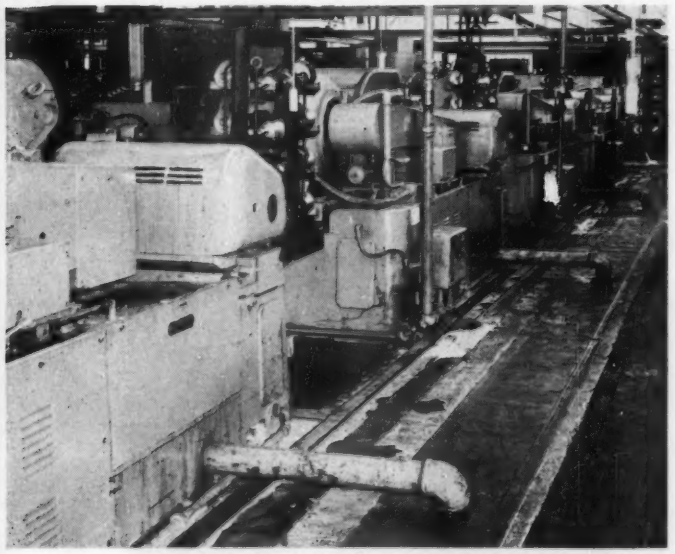




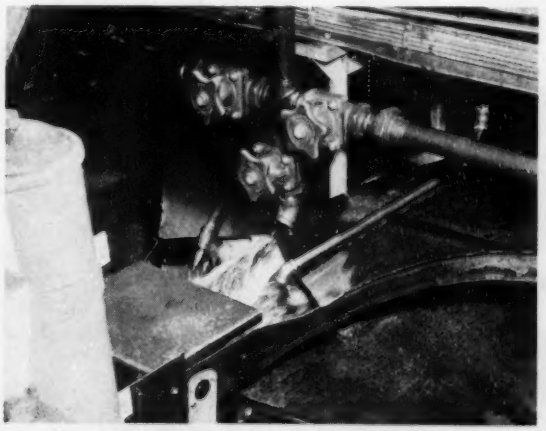
**SECTIONED, FLOOR-LEVEL CONVEYORS** run through the bases of transfer machines throughout the engine plant. These carry 16,000 lb of CI chips per hour to two central points where other conveyors pick them up for transfer into freight cars. Pontiac engineers specifically requested machine builders to provide space in machine bases for these specially built Link-Belt conveyors



**STEEL CHIPS ARE DUMPED** into railroad cars for transfer to the foundry for briquetting after being crushed. Three of 10 systems in the plant are for steel chips produced in machining. Settling tank in one of these systems is of 37,600-gal capacity, another is 7000, and the third 6200. Chips are conveyed from the machine lines to the tanks, thence to crushers. Over 8400 lb of chips per hour are moved by 13,800 gpm of coolant being pumped through machine-line systems. In the grinding lines, coolant is pumped at 10,200 gpm to move 811 lb of chips per hour



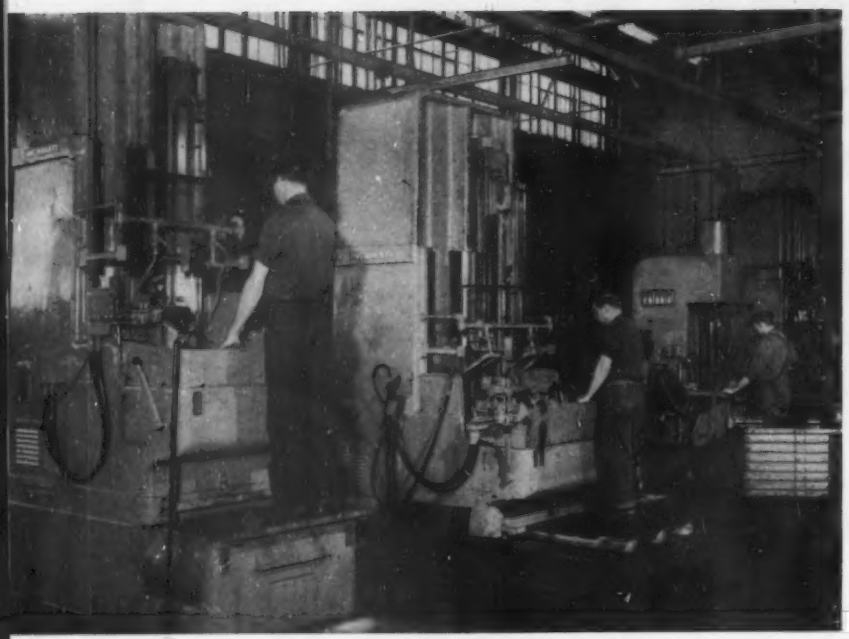
**GRINDING SLUDGE AND COOLANT** is piped under floors to one of 10 central sluicing systems where a settling tank and pumps provide a means of returning clean coolant to the machines. These 10 systems have a total settling tank capacity of 145,000 gal, use 3½ miles of pressure piping to handle engine-plant requirements



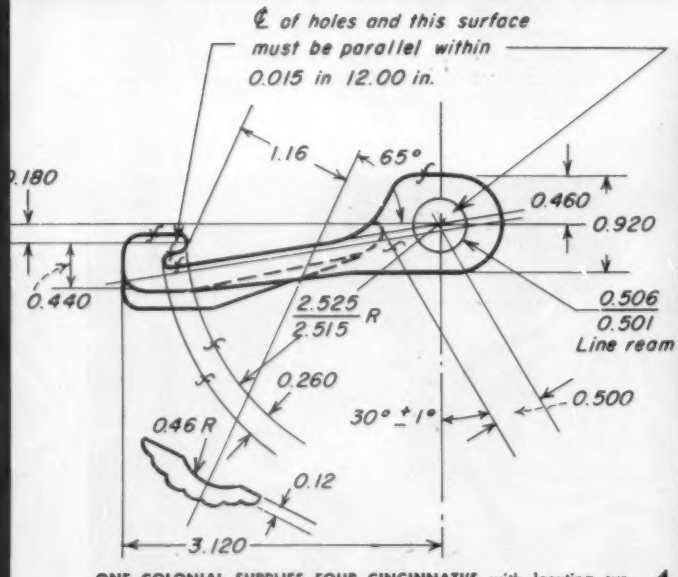
**KEROSENE FROM A TRANSFER** machine is emptied into a special sluice system. This coolant is employed in cylinder-bore machining of cast-iron blocks, and is reclaimed in a 3200-gal settling tank capable of handling 700 lb of offal per hour with a retention time of 5.33 min. Pumping capacity is 1200 gpm

# BUICK

## Dynaflow transmission

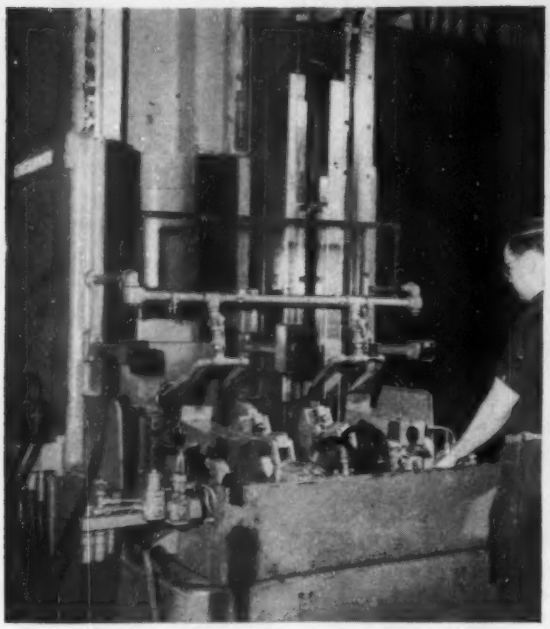


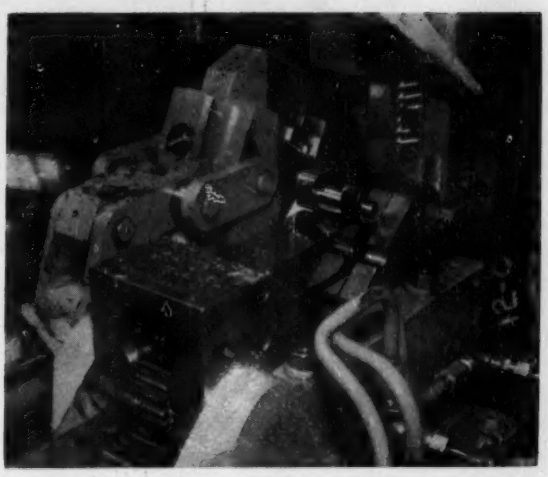
**ALTERNATING OPERATIONS** on broaching machines with double fixture setups permit high production in machining forged transmission parts. After broaching locating surfaces on an SAE 5140 brake-band anchor in one machine, parts are broached in two others, each machine performing two alternate operations to take advantage of machined surfaces for simplifying setups and providing high accuracy. For example, first machine slab-broaches sides and finish-broaches a hook which was previously rough-broached in a second machine where a forked end is also broached. Two other machines perform identical operations after receiving parts with broached locating surfaces from same machine that supplies first pair



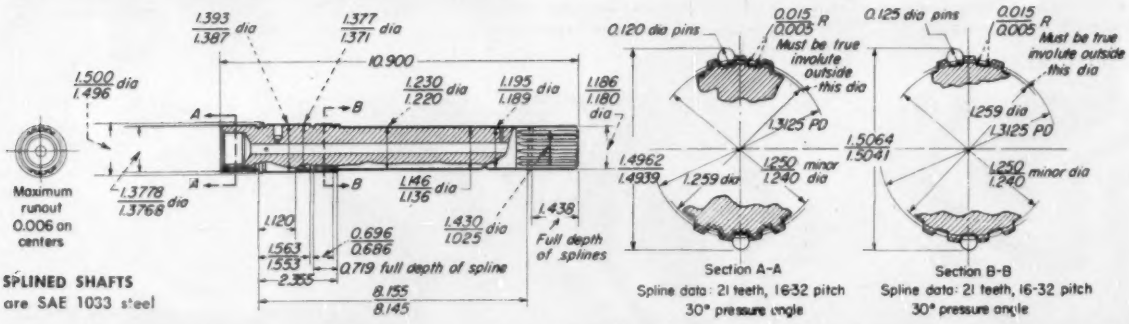

**ONE COLONIAL SUPPLIES FOUR CINCINNATI'S** with locating surfaces broached on forged brake-band anchors. Fast, simple setup provides production rate of 220 per hour in simultaneously broaching flat on hook end and surface under fork end in plane 90° to hook section. About 1/16 in. of stock is removed. Quick-acting mechanical clamp (shown open) locks work against stops and is closed into locking-stop at left of table

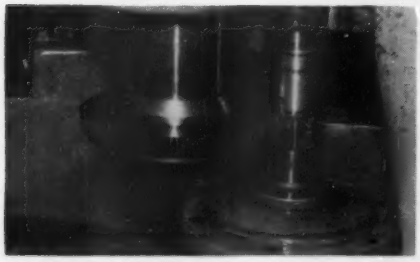
**Close tolerances and high production rates are required on transmission parts. Several changes have just been made in the Flint, Mich, plant. Here are descriptions of more interesting ones, including broaching of the brake-band anchor, rotary shaping of an involute spline on the planet-carrier shaft, honing of stator cams in a multi-station machine, and drilling reaction flanges in a multi-head drill using half the heads in each index. These are all high-production setups.**



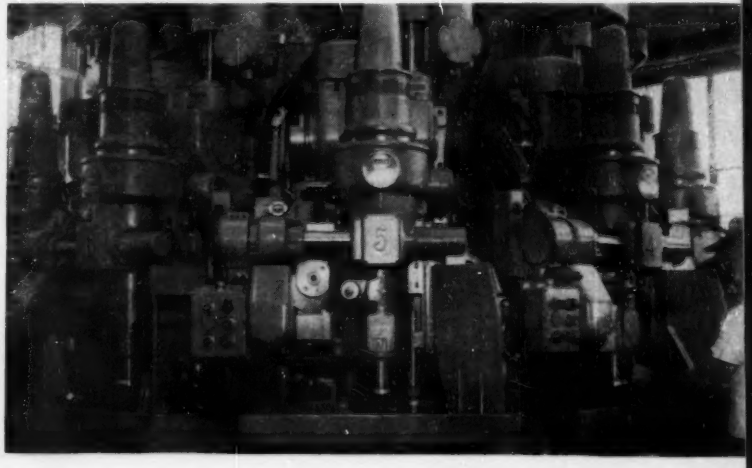


**DOUBLE TOOLING SETUP** for alternate broaching operations after locating surfaces have been machined permits fast, accurate production. In this setup, hook end is finish-broached in two fixtures at outside while sides are slab-broached in inside set. In the companion machine, hook is rough-broached and the fork broached. Hydraulic cylinders and rack and pinion drives automatically move fixtures into and away from broaches



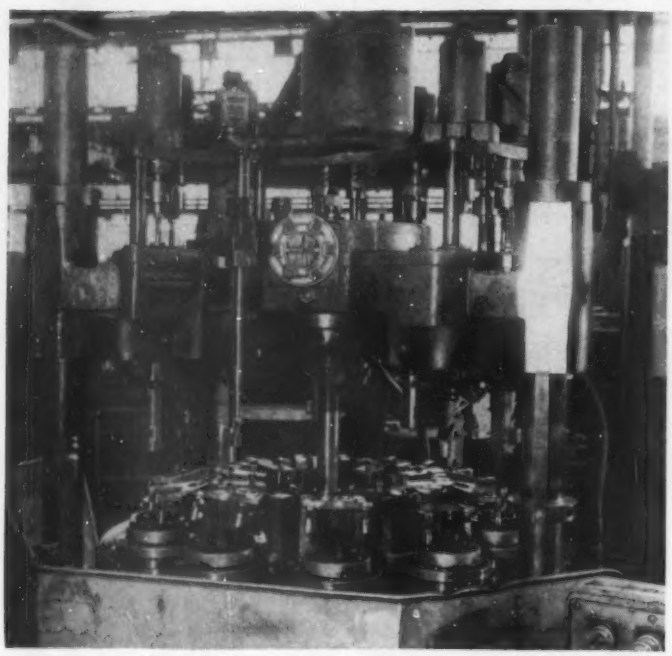



**OVER 125 PIECES PER HOUR** is production rate for shaping 21-tooth spline in end of planet carrier shaft. Special 10-station Fellows rotary gear shaper has standard vertical heads, each of which completely finishes part by the time machine makes one complete rotation. A conveyor removes chips from the base, being fed by a screw from the magnetic separator. Two other splines are produced later in Cleveland hobbers

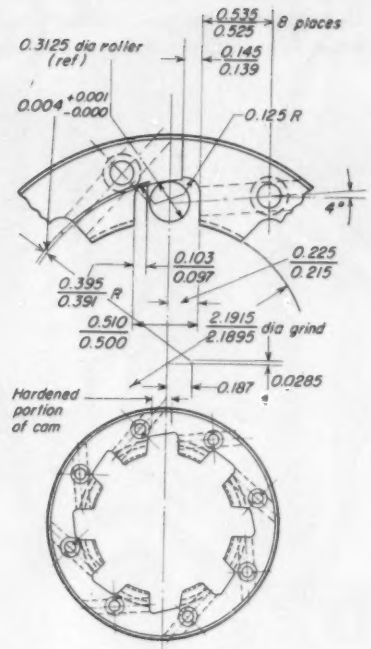


## BUICK

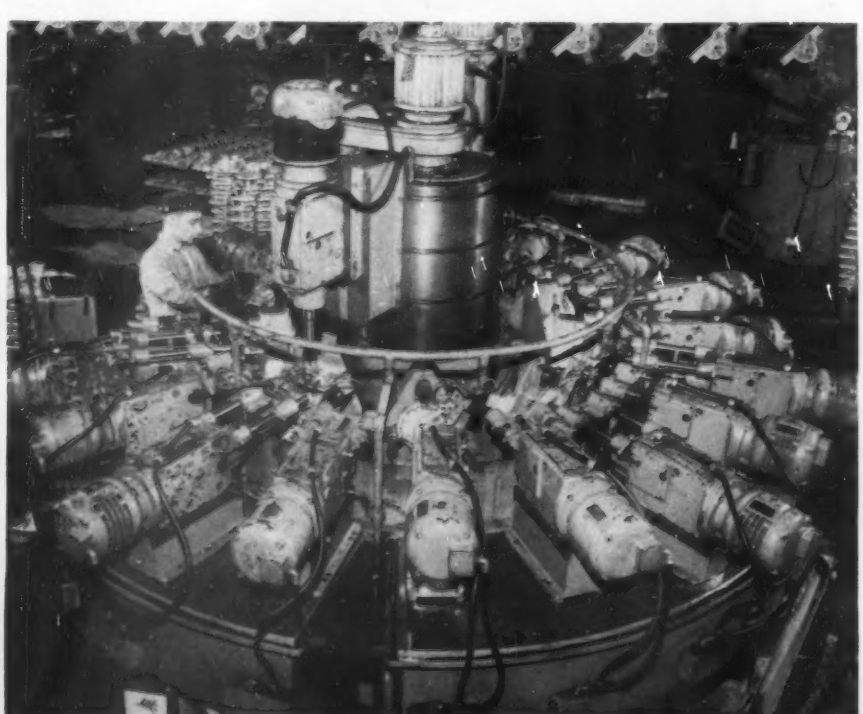
### *Dynaflow transmission* . . . continued



**SPECIAL MICROMATIC INDEXING MACHINE** hones 80 cams per hour with hydraulically operated fixtures that automatically locate and lock work. Cam track under table rises under loading station to open and close fixtures automatically. Two of 10 stations are employed for loading and unloading, remainder being used to carry cams under 8 vertical heads, each of which hones one lobe. Honing compound is 75% kerosene, 25% P46. Stones are medium-hard and open-grained




**SMOOTH, ACCURATE SURFACES** are required on lobes of SAE1062 internal stator cams. Lobes are hardened to $R_c$ 62 (balance of cam is $R_c$ 38), ground, then lubricated before honing square with faces within 0.001 in. TIR. Stock removed is approximately 0.001 to 0.002 in.



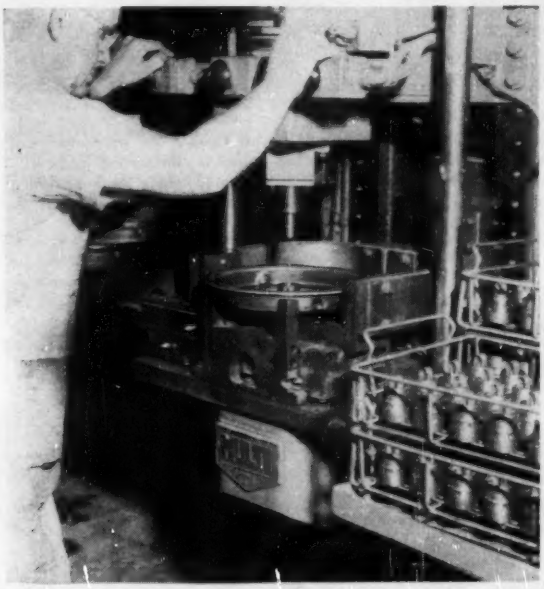
**DEEP HOLES ARE DRILLED** in cast-aluminum reaction flanges in this 18-station automatic-indexing Kingsbury machine. Each part has 10 drilled holes, every other station partially drills different holes, adjacent heads complete drilling them to depth. Nine fixtures carry parts, first to one set of heads, then to the other. Production rate is about 100 parts per hour using HSS tools and mineral seal oil coolant. Holes range from 3/32 to 17/64 in. in diameter and 5/32 to ¾ in. deep. Chips are washed into a tank by the coolant, thereafter conveyed out. Work is brought in and taken out by both overhead and floor-level conveyors

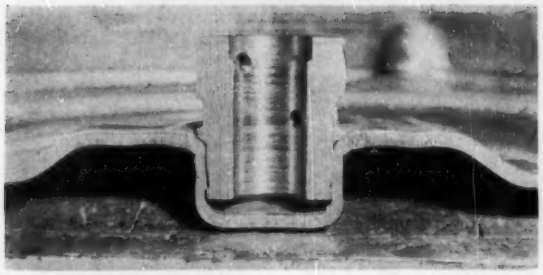
# PACKARD

## Ultramatic transmission

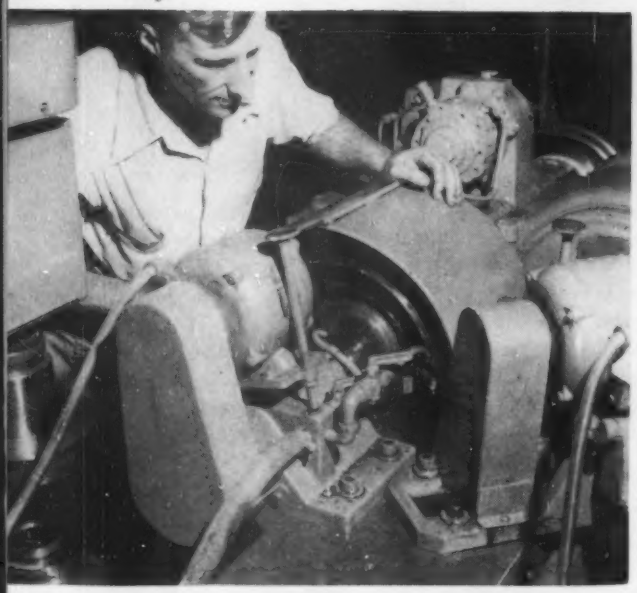
**Unusual modifications of standard welders, and special machining and assembly units are combined in this Utica, Mich, plant. Included in welding units are a welder which hot-upsets a hub in assembling it to a converter-clutch housing and a 4-station rotary-indexing table with nests to locate sun gears and flanges for inert-gas-shielded metal-arc welding. Needle bearings are automatically loaded into the ends of planetary gears in special machines. Permanent fixtures on a slat conveyor hold the case for final assembly; converters, valve bodies, pistons, brake bands, and other units are tested, then added. Near the end of the line, a special static rotating balancer checks the converter within ½ in.-oz and weights are welded by a Weltronic head.**

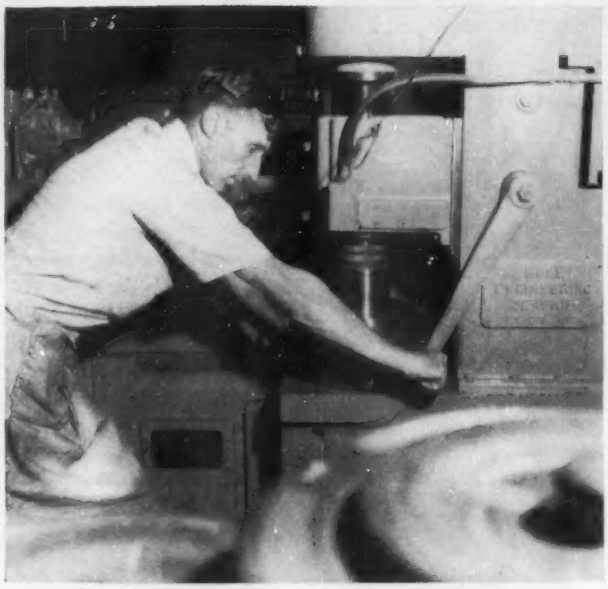
**ROTARY INDEXING TABLE** with four stations nests HRS flanges and hardened alloy steel sun-gears for inert gas-shielded metal-arc welding. Flanges are pressed on gear hubs, after which assembly is loaded into bronze water-cooled fixtures that fit into nests on table. (Heat dissipation is necessary to avoid tempering hardened gears.) A rubber tire under the welding head rotates the nests while the automatic unit lays the first bead in the joint. The second bead is produced in another pass under head. Test load on the joint is 10,000 in-lbs, and production rates exceed 80 assemblies per hour





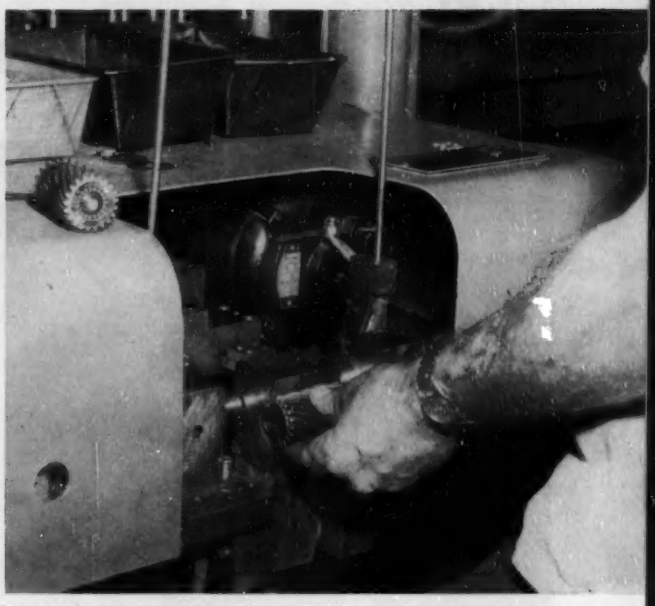
**HOT UPSETTING IN A WELDER** is accomplished by applying heat and pressure to 1020-steel converter clutch housings and hubs. A housing is located in the fixture and a hub is pressed in place by means of the ram, after which roller contact electrodes on two sides are brought into engagement as in spot welding. Work is then indexed 180° for application of heat at two more spots, producing a joint that is capable of more than 20,000 in-lb load





**SPECIAL AUTOMATIC LATHE** finishes converter clutch housing hug faces to 32 mu in. rms for thrust washer contact and simultaneously finishes a 45° chamfer to less than 20 mu in. for sealing purposes. More than 50 an hour are done in this setup where the main slide carries a special Superfinishing cup wheel to the hub face while a special stick stone enters at 45° for Superfinishing the sealing face. A vertical Bearingizing unit with this machine holds an 8-in.-dia bore within plus 0.001, minus 0.002 in. and 50 mu in. rms finish. A taper attachment in this unit permits adjustments for various diameters

**FINAL ADJUSTMENT** and removal of completed transmissions from fixture on 120-ft assembly-line conveyor precedes test-stand operations. All components fed to the line receive functional tests before assembly. For example, directional control valves are test-operated in the same way in which they perform in actual use

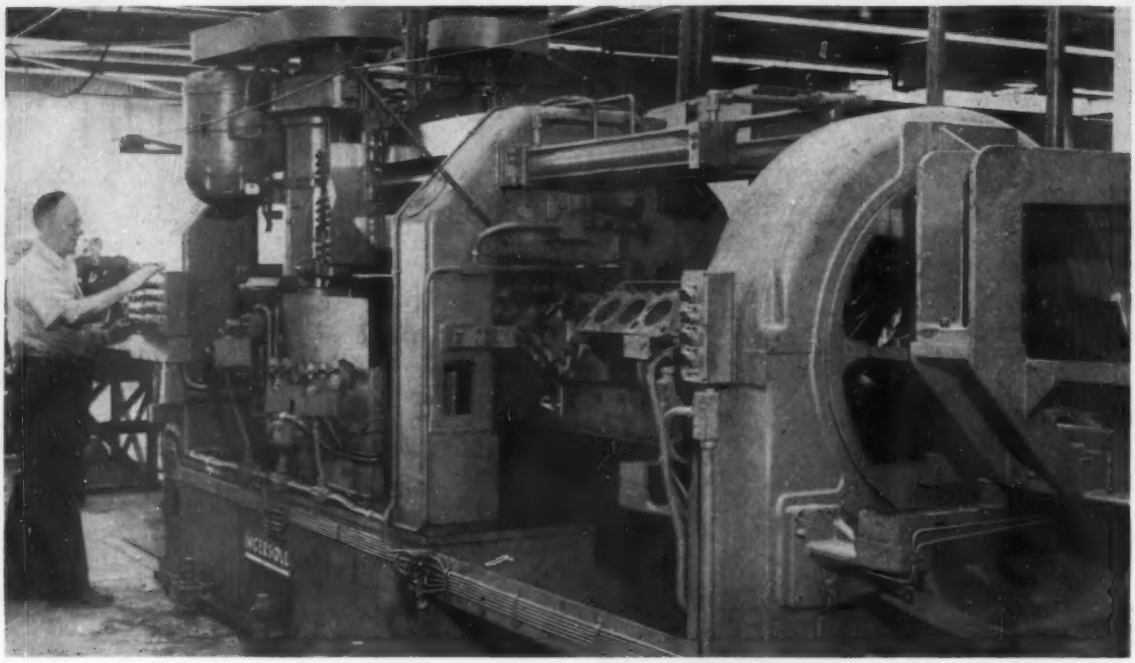


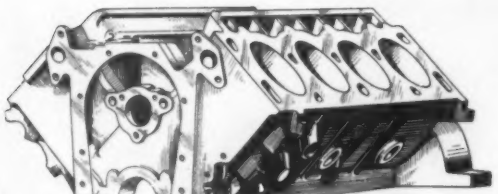
**AUTOMATIC BEARING ASSEMBLY** is performed in special machines where needle bearings are fed from Syntron vibratory hoppers. Two hoppers are employed in each setup, one for short bearings installed in one end of a planetary-gear bore, the other for long ones that go into the opposite end. Reciprocating slides receive the bearings and move forward into alignment with a gear which is installed in a fixture on a dummy shaft. This shaft merely keeps the bearings in place until the gear is later assembled on a permanent shaft. The operator then trips a foot-operated linkage that actuates pistons in alignment with the bearings to drive them into the ends of the gear bore. A production rate of more than 100 assemblies per hour is achieved

**BALANCING CONVERTERS** within ½ oz-in before assembly is done in special static balancer in combination with Weltronic spot-welding head. Converters are filled with oil and rotated at 600 rpm while an oscilloscope shows degree of balance. Small weights are quickly spot-welded to casing to correct unbalance

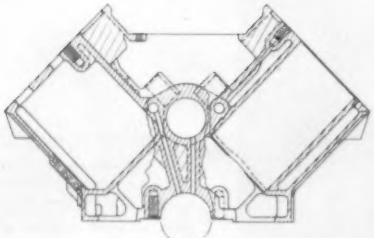
# PACKARD

## V-8 Engine..cylinder block, head

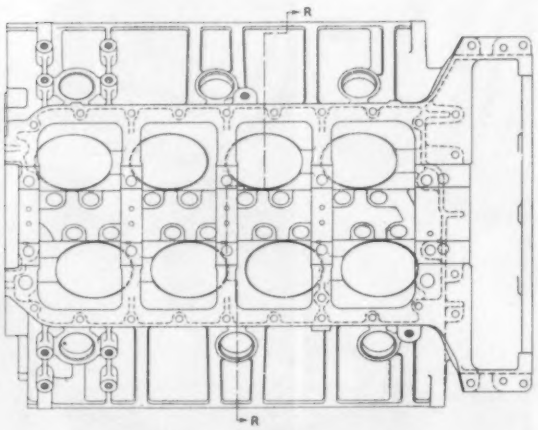




**MULTITUDE OF MACHINING** operations on V-8 engine cylinder blocks begins in this 11-station Ingersoll transfer machine, one of 4 in the 800-ft automated line. Here inspected castings are loaded top side up and front end first for milling 4 locating pads with 4½-in.-dia carbide-tipped cutters. Blocks are then turned 180° to place the pan rail up, by means of a turnover fixture, for rough-boring half crank bearings and core-drilling cam bearings, both operations being held within 0.005-in. total tolerance. Rough and finish milling the pan rail and bearing-cap seats follows, together with broaching the bearing-cap seats, drilling, chamfering and reaming 2 locating holes, inspection of the pan rail for flatness, and height and the bearing-cap seats for width, and finally drilling 10 more holes



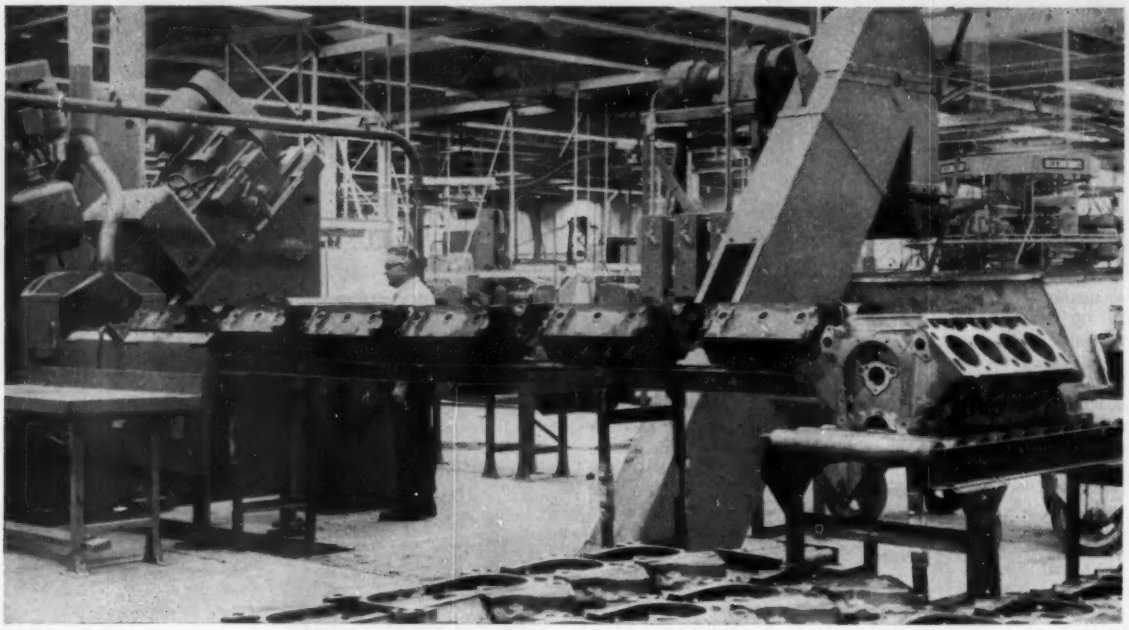
Section R-R



Three years of planning have resulted in the new Utica, Mich, plant, in which over 1 million sq ft are devoted to production of V-8 engines and Ultramatic transmissions. First machines were ordered in 1952.

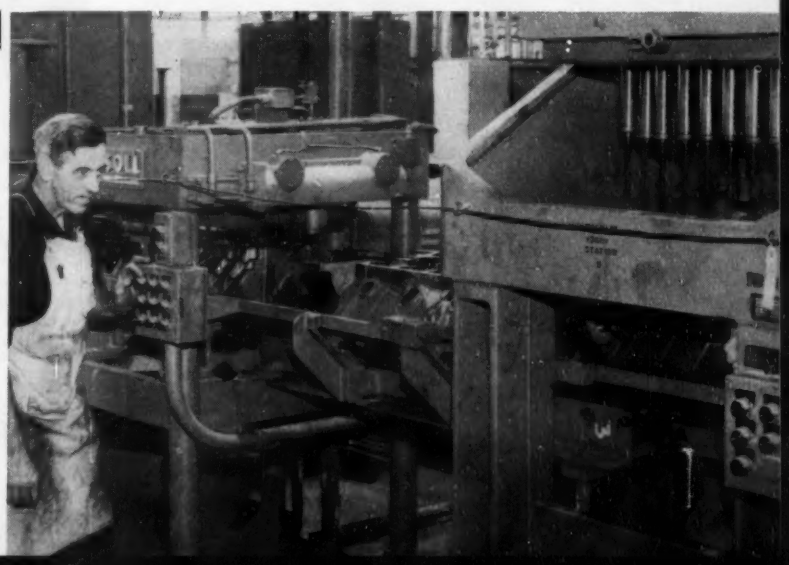
Automated block and head lines, extensive conveyorization, part lines with automation units, chutes, and integral loaders and unloaders — all these are incorporated. If the part is subject to frequent design change, new equipment is standard types; where expected production permits, it is special. Thus, because the V-8 is expected to be the industry standard for some time, this line is largely special equipment. In contrast, equipment for small parts such as gears and valve groups is largely standard. Expenditures were split 80% for machines, 15% for small tools, and 5% for specific automation units.

Tooling is almost exclusively carbide. Elaborate CI dust-collection, chip-disposal, and coolant-reclaiming systems are included. Soluble-oil concentrate, stored in a 15,000-gal tank, is pumped through proportionate mixers to provide mixed soluble oil and water. This feeds a closed-circuit central coolant system with three main tanks, one 18,300-gal grinding-sludge settling tank, a 12,000-gal chip-settling tank, and a third for special chips such as aluminum. There are 9 intermediate pre-settling tanks of 7000 to 10,000 gal which reduce to 6 min the settling time in the large tanks. All have flight conveyors leading to dump trucks



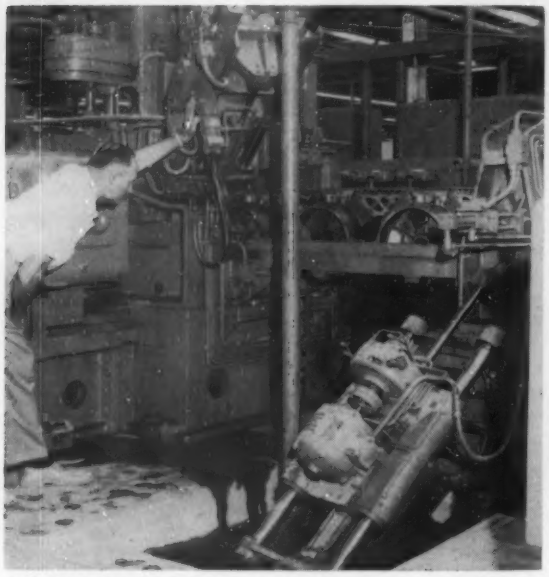
**CHIPS ARE REMOVED** from drag-chain conveyor under the floor by flight conveyors like this one spotted through the line. Dump trucks dispose of chips into trailers which carry them to various areas for removal from the plant. Concrete trenches for conveyors under transfer machines are lined with steel plate, run about 2000 ft through block and head lines alone. Part of dust-collection system serving all CI cutting operations is visible at heads on Greenlee transfer machine where exhaust ducts carry dust to overhead manifold for passage through Cycoil oil-bath air filter (one of 30). Heavy particles are returned to trenches for removal with chips, fines are cleaned out of filter and clean air is exhausted from filter back to room, saving heating cost in cold weather

**AUTOMATIC PROBE** checks for broken drills and blows chips from pan rail and bearing-cap seat holes before blocks receive further chamfering and drilling operations. Hydraulic unit behind setup man blows compressed air through hollow probes to force chips ahead. Probes are set to enter a specific depth, thereby insuring correct depth of holes and absence of broken drills. Should holes of insufficient depth or broken drills be found, the unit automatically shuts down the station preceding it to prevent continued errors and to permit immediate correction. Line is set up to produce 70 blocks per hour and is equipped with adjacent conveyors and automatic devices for removing defective parts without disrupting schedule. Bank of blocks in these conveyors permits immediate replacement when a block is pulled from the line for any reason

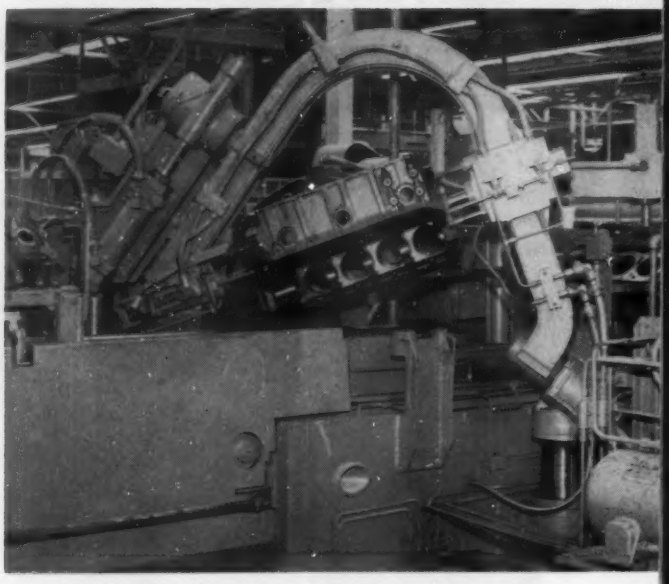


## PACKARD

### V-8 engine .. cylinder block, head

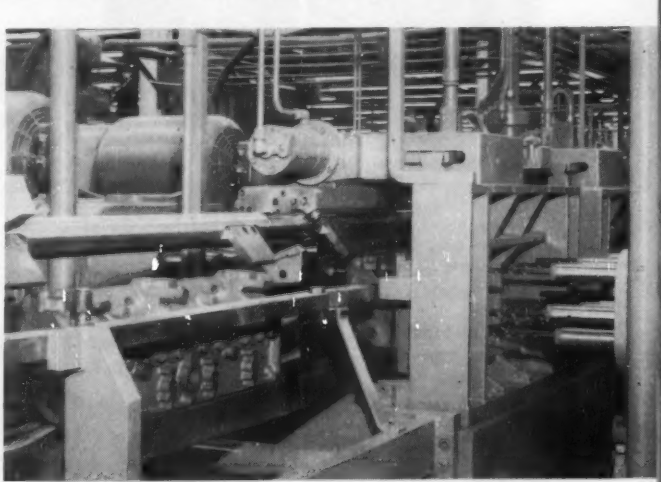


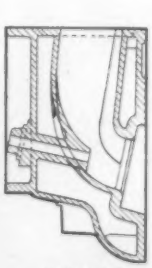
**ANGULAR HEADS** in 16-station Ingersoll transfer machine are set at 32° 30′, equipped with HSS drills for producing oil gallery holes in blocks. Other operations in this machine include rough and finish milling front ends, rough and semi-finish milling flywheel housings with 14-in. dia carbide-tipped cutters, boring oil-filler and distributor-shaft holes and drilling, counterboring, countersinking, and chamfering numerous other holes. Chips are blown out and hole depths are checked by means of an air probe at the 13th station, after which oil-gallery holes are inspected for leaks. Setup men are responsible for and watch over 30-ft lengths of this line. Overhead safety cord is employed to shut machine down from any convenient point if trouble is found



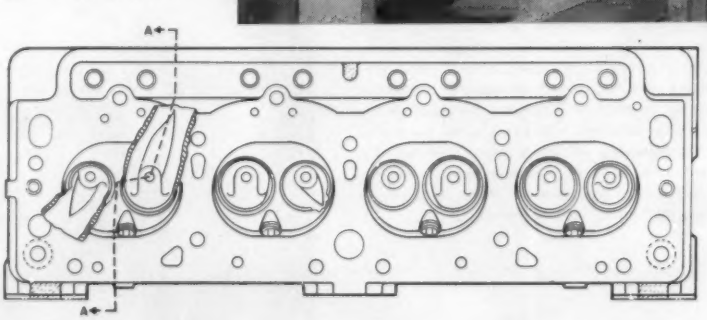
**UNUSUAL AUTOMATION FIXTURE** in this 15-station Greenlee machine lifts blocks up from left bank face and swivels them through two 90° turns to place them endwise across the ways with the oil pan down. Hydraulic fixture has universal joints in each of two columns, one on each side of the line, hydraulic clamps grip the ends of the block while it is elevated straight up, then twisted and lowered into position for tapping holes in flywheel and front ends. Semi and finish reaming 16 tappet holes preceded this movement as did tapping 30 cylinder-head bolt holes, and others

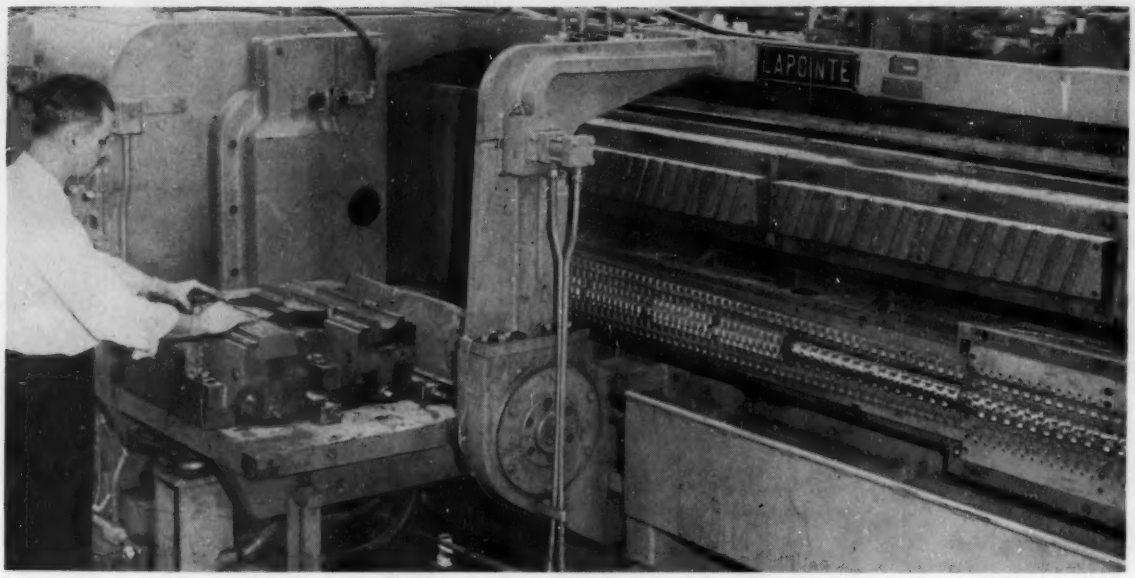
**COMPLETE AUTOMATION** on the cylinder-head line is represented by this 19-station WF & John Barnes transfer machine (one of three—others are 18- and 5-station machines) following a 12-station Ingersoll. Here, holes for bolts, spark plugs and push rods as well as valve cover holes, water holes, valve-guide holes and others are drilled with HSS tools. Spotfacing, milling, countersinking, core drilling, boring and reaming are also done. Loading and unloading throughout the line, of course, is automatic and banking is provided for by adjacent conveyors, as on the block line. Cross tool boards control tool wear and permit immediate replacement as needed

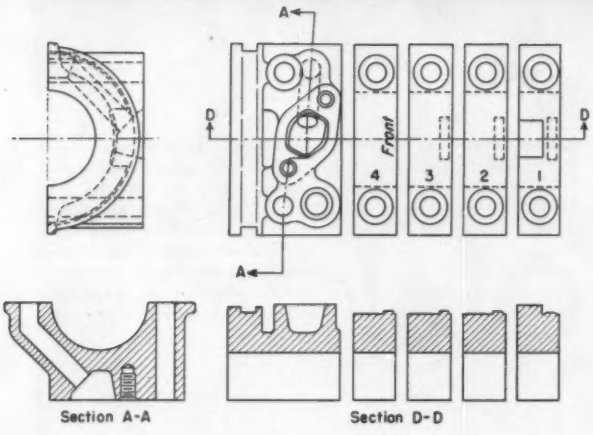


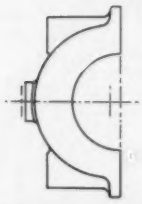


Section A-A

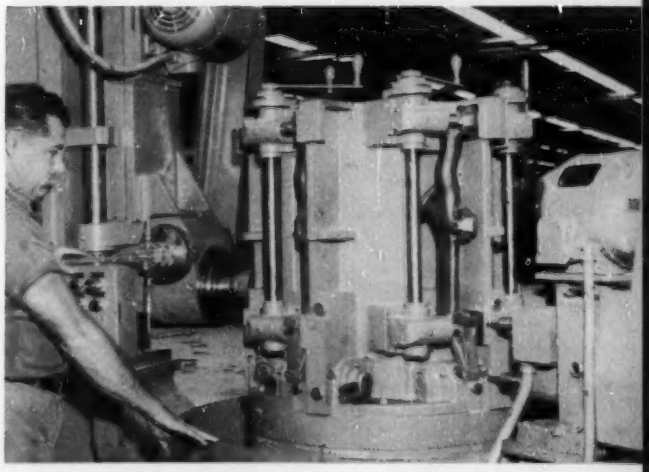




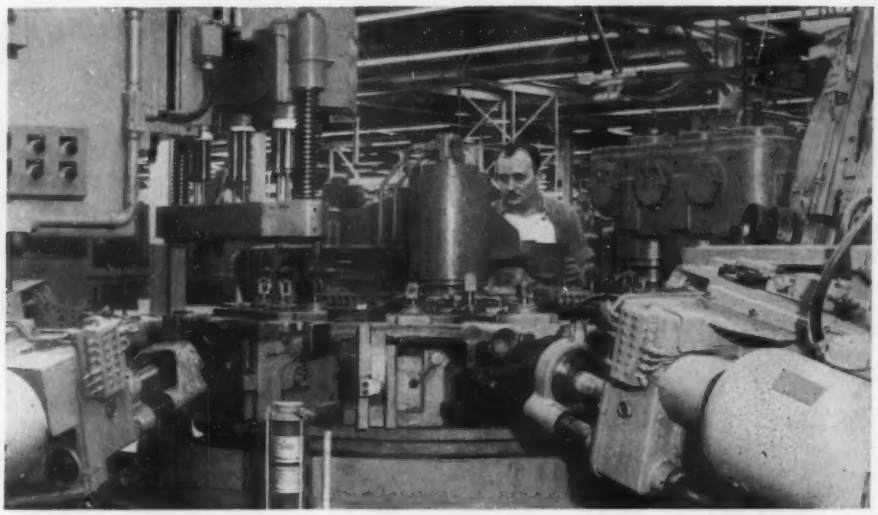
**SPECIAL FIXTURES AND PLATEN** on this 50-ton, 120-in. horizontal Lapointe broach holds two bearing-cap blocks. Top, sides, and joint surfaces are broached in one block, half-round bearing bore is rough- and semi-finish broached in second. Automatic machine cycle pivots platen to lock work against broach faces for 0.062 to 0.080-in. depth of cut at 150 sfm. Subsequent operations are performed in a 12-station Kearney & Trecker transfer machine where bearing-cap blocks are milled, drilled, reamed, tapped and parted. Probing units in this machine too, are employed to check for depth of holes and for broken drills. After burring, caps are cleaned in a Detrex washer, then inspected

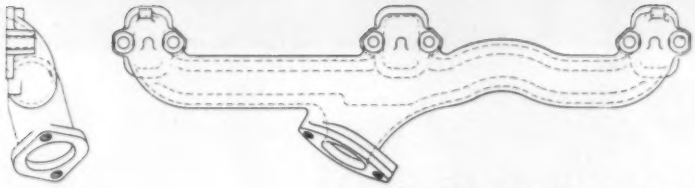


**MILLING, DRILLING, AND TAPPING** generator mounting pads on right-hand exhaust manifolds follows same machining operations as performed on left-hand parts in Snyder machine. Here the first of a 5-station Drillunit machine is manually loaded and unloaded, using self-centering mechanical clamp, while the second station is employed for milling the pad with a carbide cutter. Two 0.261-in.-dia holes, 0.875 in. deep are drilled in the third and countersunk and tapped in the fourth and fifth stations respectively. This hydraulically operated, semi-automatic machine produces 120 finished parts per hour at 70% efficiency

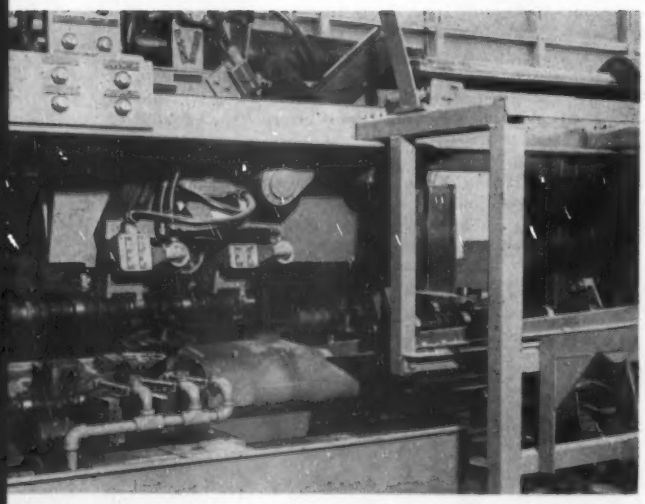
**PACKARD**

***V-8 engine .. cylinder block, head***

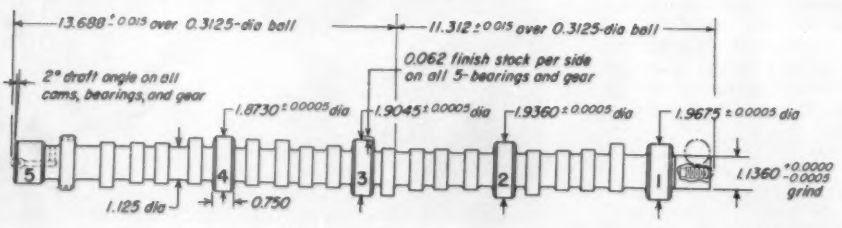


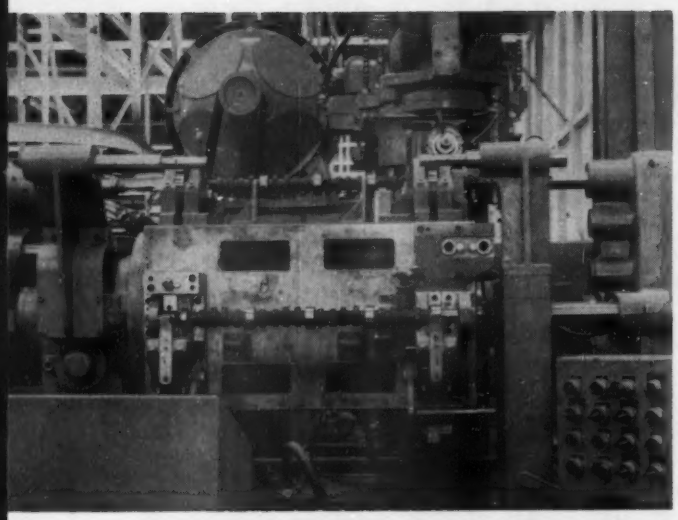


**ALL MACHINING IS COMPLETED** on left-hand exhaust manifolds in this special Snyder 6-station rotary transfer machine. First station is employed for loading and unloading, second for milling 3 joint faces, to within plus or minus 0.010 in. with locating bosses and holding 3 faces parallel within plus or minus 0.005 in. The exhaust flange is milled in the third station, and in the fourth, the exhaust hole is counterbored. A vertical head in the fifth station produces 6 through holes, and a horizontal head is employed for drilling and countersinking 2 other holes. Two holes are tapped in the sixth station to complete the cycle

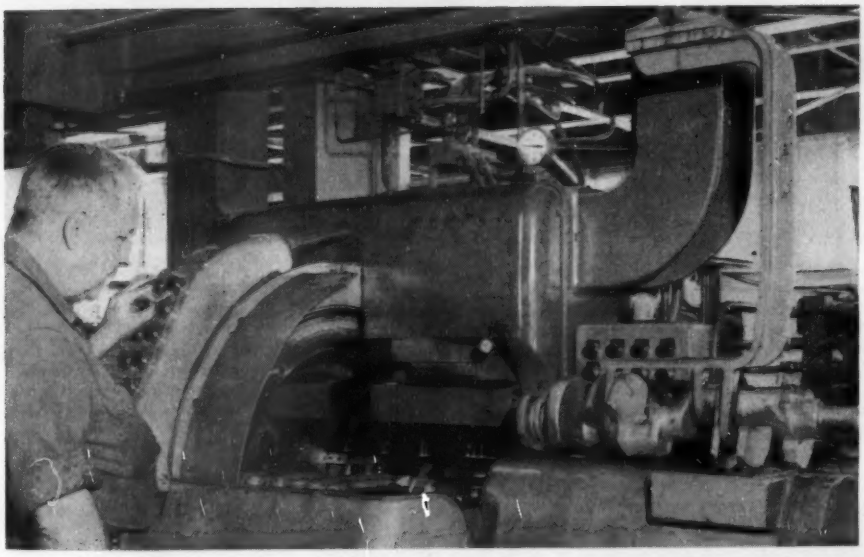


**AUTOMATIC LOADING AND UNLOADING** is part of this twin Lo-swing lathe setup where camshafts with flame-hardened cams are machined. Rack at right feeds camshafts to one of two load fingers which carries it to a position over tool area. Before it is positioned between centers, however, a second load finger removes a finished part and transfers it to a turntable arm at the rear for loading next lathe. First lathe turns Nos. 1 and 2 bearing and gear dias, chamfers bearings and faces end of shaft. Second lathe turns Nos. 3, 4 and 5 bearings and chamfers both sides of bearings and gear. (See AM —Mar 29, 54, p110)

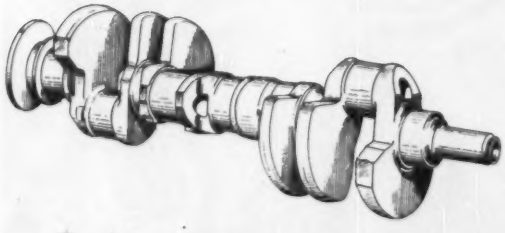




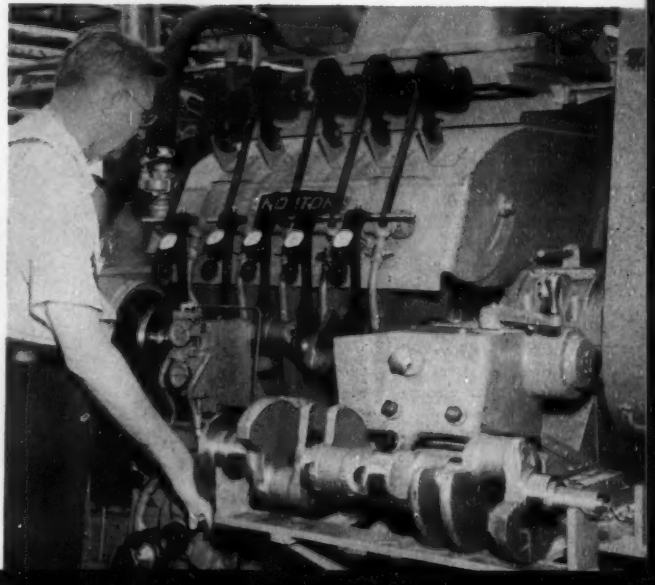
**AFTER BEARINGS ARE MACHINED,** camshafts are loaded in this Hartford Special 4-station vertical trunnion machine for drilling, countersinking, counterboring, tapping and milling. Loading and unloading occurs at the first station, drilling and counterboring one 0.316-in.-dia hole in the second. Third station taps this hole and drills two 0.188-in.-dia holes at 90° to each other in the opposite end. In the fourth station, end holes are countersunk and Woodruff keyway is milled 0.952 in. from No. 1 bearing face. Work is transferred from here to Landis grinders for removing fins between cam lobes and bearings, then checked and straightened, after which bearings are finish ground in Norton multiple-wheel grinders. Finish-grinding gear dia and thrust faces follows in Norton angular-wheel machines, then additional checking and straightening, followed by rough and finish grinding the cam lobes in Landis automatic cam grinders. Final operations include cutting gear teeth in Lees-Bradner hobbers, shaving the teeth in National Broach machines and inspecting them in Illinois lead checkers. After a final straightening operation, gear teeth are brushed and blown off, bearings are polished and the camshafts are washed, dried, final-inspected and Lubrited



**CRANKSHAFTS ARE AUTOMATICALLY LOADED** into this Wickes center-drive lathe after having 8 locating spots milled in a special Sundstrand crankshaft machine. Here, carbide tools are used to face the flywheel end, finish face the flange, turn and form an undercut groove on the pilot dia, turn the oil-seal bearing and slinger and turn main bearing and gear dias among other operations. Work is picked up from a loading rack by the loading arm, right, which positions it in chuck at center. A second arm removes finished work from the chuck and automatically unloads it in a rack at the left

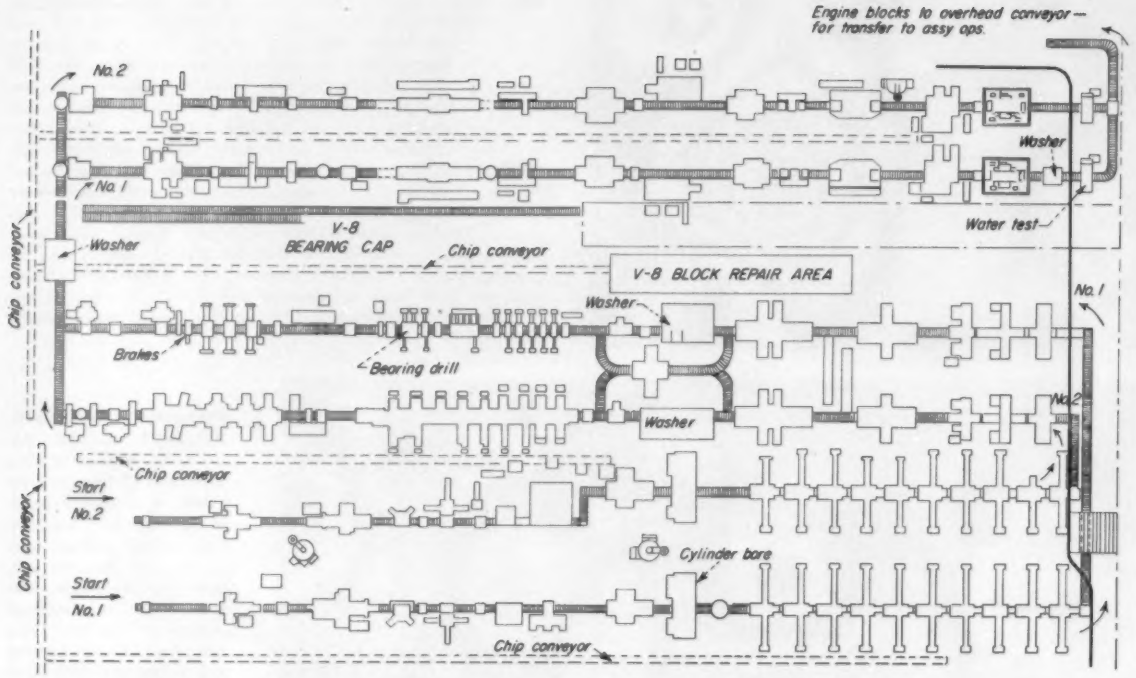


**ALL MAIN CRANKSHAFT BEARINGS** are rough ground in this special Norton semi-automatic multi-wheel grinder. Crankshafts are then conveyed to LeBlond double-spindle lathes for turning pin bearings, followed by drilling of oil holes in 8-spindle Leland Gifford drilling machines. Bearings, thrust faces, flange and pilot and gear dias are then finish ground in more Norton machines after which holes are drilled, counterbored, chamfered, reamed and tapped in special Baker 10-station double-end drilling machines. Pilot bearing holes are finished in Simplex boring machines and all pin bearings are finish ground in Norton and Landis machines. Final operations include milling keyways, straightening chamfering oil holes, balancing and drilling for balance in Gisholt dynamic balancing machines

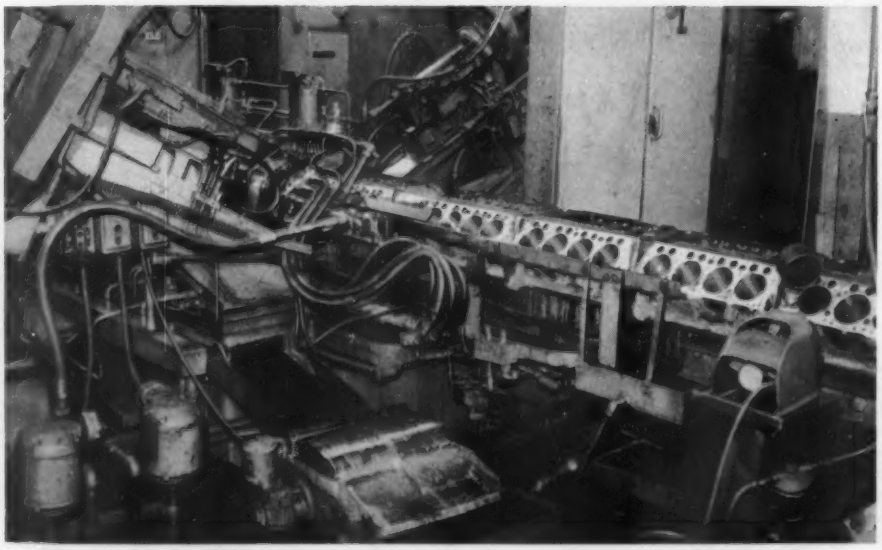


# CHRYSLER

## V-8 engine block

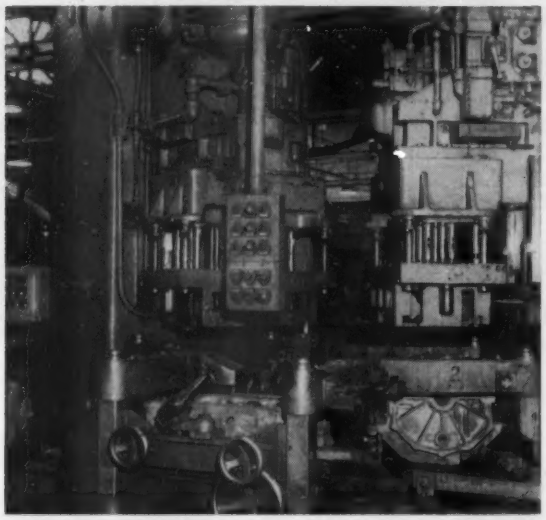



**TWO S-SHAPED LINES** for V-8 engines, each 1000 ft long, are completely automated to minimize manual handling from start to finish. Shuttle, motorized, and roller conveyors are included in the installation, as are roll-over, tip-up, indexing and elevating fixtures. Automatic loading and unloading are facilitated by transfer bars, swinging arms, and hydraulic clamps. Where necessary, automatic storage is provided for by conveyors adjoining each line. Typical of the control maintained over work transfer is the electrically controlled, motorized, conveyor section following cylinder-bore honing where blocks are stored to await transfer when the washers are filled. An extra Micromatic hone is also set up in this section for rehoning if necessary

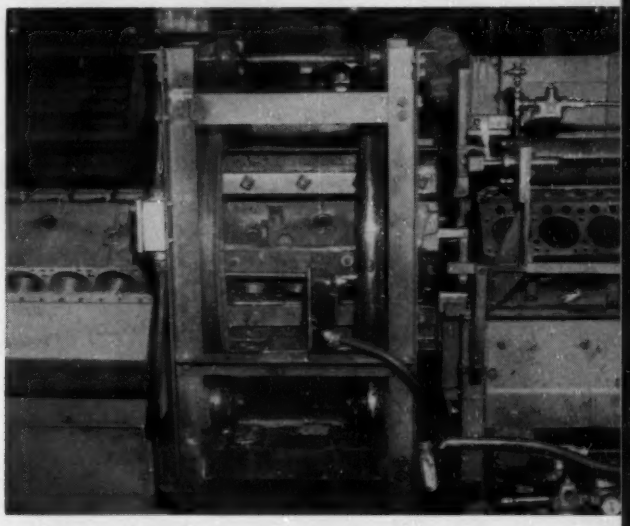


**AUTOMATIC SHUTTLE BAR** picks up 2 engine blocks at a time from free conveyor and loads them into a fixture in a Snyder machine for reaming valve tappet holes. Machine indexes to ream 2 holes (one on each side of each block) simultaneously until all holes are complete. Carbide tools and Ziegler floating holders help hold size and maintain tolerances of 0.0005 in. Coolant is recirculated from tank in the floor after passing through Barnes magnetic separator for removal of foreign particles

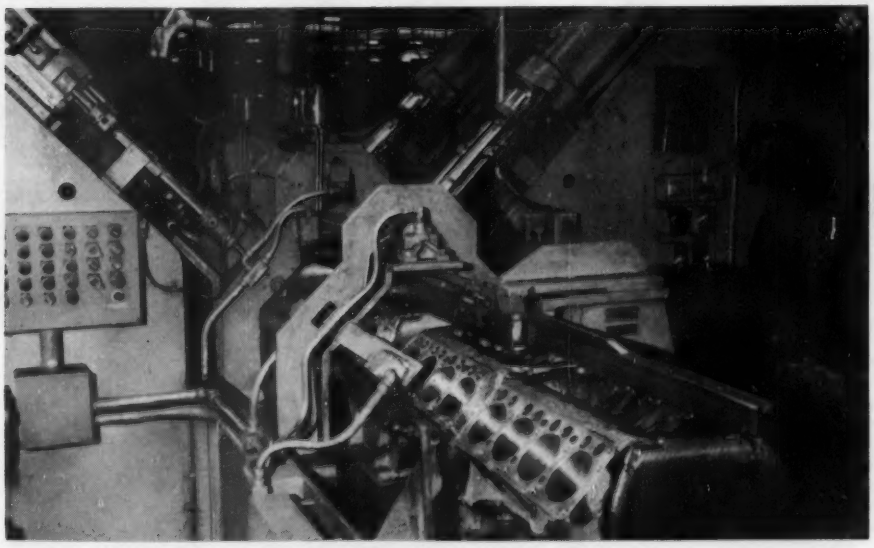
**Two new 1000-ft fully automated lines at the Jefferson Ave plant, Detroit, mark transfer of V-8 engine production from Trenton, Mich, and increased production. (No 6's will be used in '55 Chryslers.) Marine and industrial V-8's will be made henceforth at Trenton. Because plant layout does not permit straight-line installation, both new lines have compact flat S-shape. Individual machines with their own panels and circuits, rather than multiple units controlled from a few central sources, have been used for flexibility to handle design or model changes. Manpower is used mostly for preventive maintenance, tool setting, inspection, and supervision; there is no hand pushing or positioning of blocks. Roll-over and tip-up fixtures, shuttle and transfer bars, elevators (to align part and machine) and indexing fixtures to rotate parts 90 or 180° are all included. Adjoining conveyors bank blocks automatically. Key-station control keeps two machines loaded while a third stands by, ready in case of breakdown or line overload, protected from overload in its turn by automatic control on its feed conveyor. Underfloor conveyors remove chips from machines automatically, and some units have their own apron conveyors and magnetic separators so cutting oil can be reclaimed.**



**HYDRAULIC INDEXING TABLE** is integral with 2 Baush multiple-spindle drilling machines in each line. Blocks are carried out of line and located successively under heads for drilling and reaming 2 locating holes, drilling and counterboring 10 bearing-cap and cap-screw holes, and spot drilling to start crankshaft-bearing oil holes. Automatic conveyor sections from the preceding operation (milling oilpan faces), carried the blocks to this setup where they are automatically loaded, then clamped and indexed around. Following this operation the blocks are automatically carried to a Lee machine for drilling and chamfering water drain holes, drilling clip screw and distributor holes and for counterboring Welch plug holes



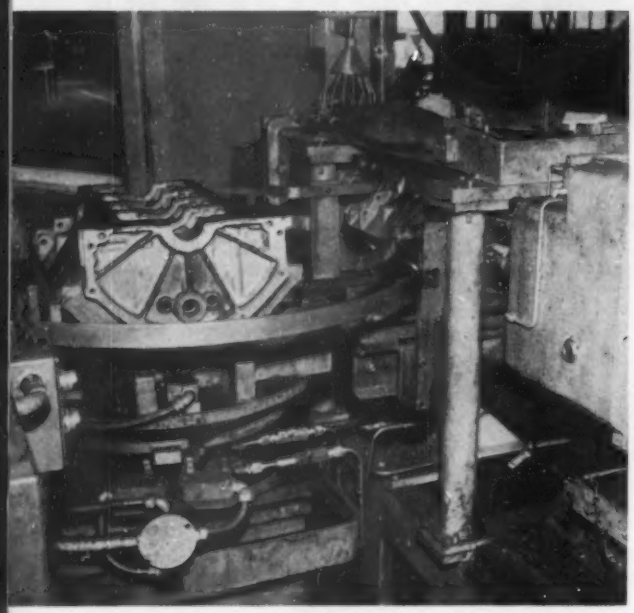
**TYPICAL ROLL-OVER FIXTURE** follows honing and washing to turn blocks 180° in the vertical plane for placing cylinder face down and oilpan face up. In operation, a transfer bar pulls a block into the fixture where it is automatically clamped for rotation. After being turned over, clamps are released and a hydraulic cylinder, top right, automatically pushes the block into the line. An indexing table at the next station rotates the blocks 180° in the horizontal plane for automatic bore inspection in a Sheffield air gage. This presents first one side of the block then the other to 4 plug gages



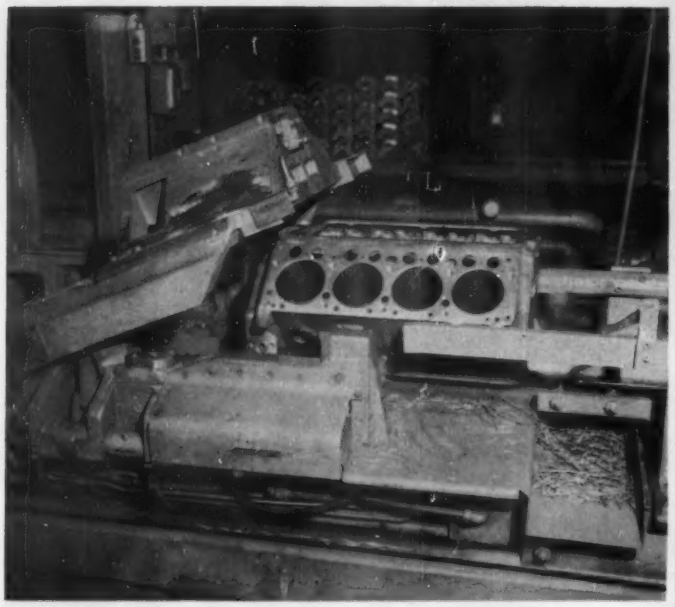
**TRANSFER BAR MOVES WORK** from free conveyor to battery of two 2-spindle Micromatic hones where cylinder bores are finished. Blocks are loaded in machines 2 at a time and honed within 0.001 in. total tolerance. Each bank of four cylinder bores is honed with the same honing tool and stones. Motorized conveyor immediately adjoining this setup stores the blocks when International washer, into which they go next, is loaded

## CHRYSLER

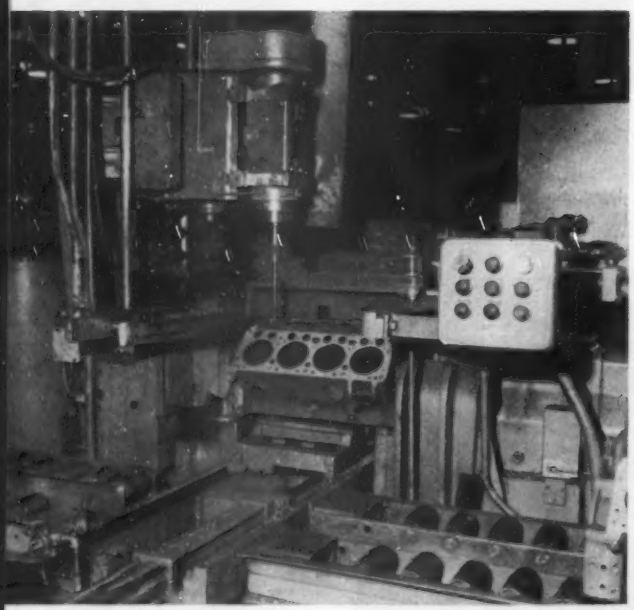
### V-8 engine block



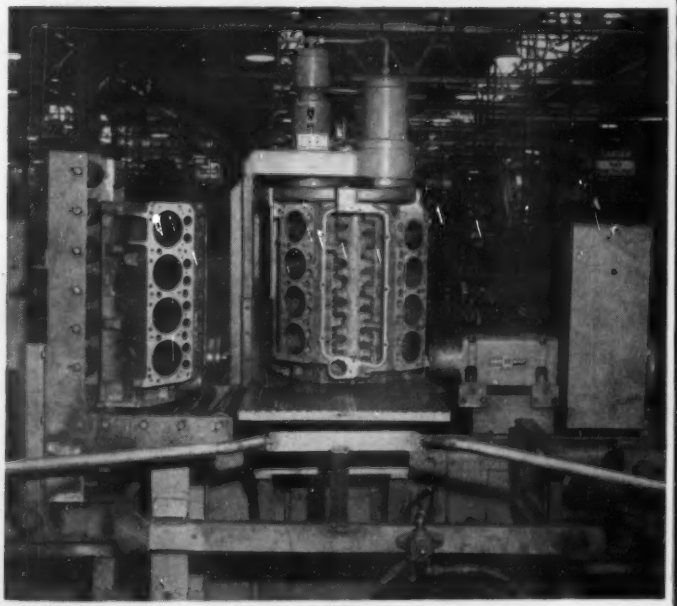
**INDEXING FIXTURE** presents both ends of engine block to special machine for tapping. Work was previously removed by transfer bar from Snyder machine where roll-over fixture permitted tapping both oilpan and cylinder-head faces. Automatic loading, unloading and positioning of blocks for these operations simplifies production and insures a high degree of accuracy



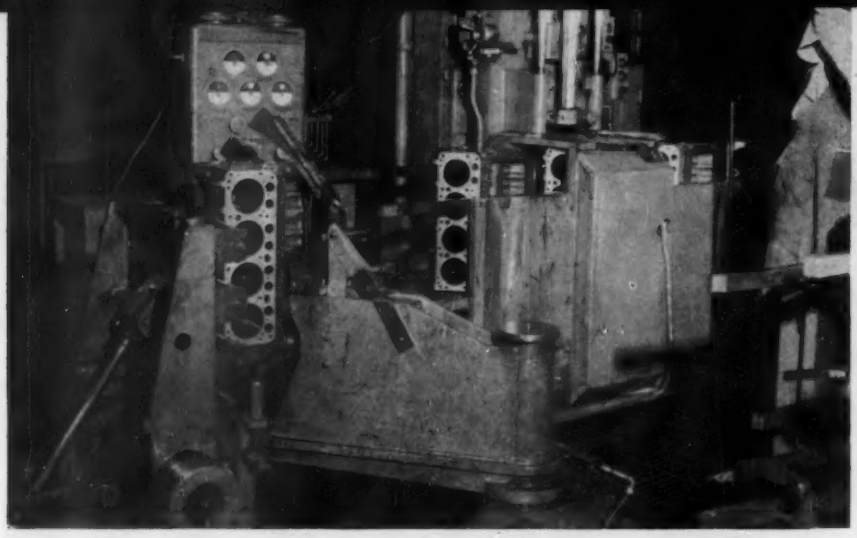
**AUTOMATIC LOADING** a Cincinnati horizontal machine for finish-broaching cylinder-head faces is accomplished by means of a transfer bar and this hydraulically operated slide. Clamping head opens after bar pushes a block into the slide. After work is located and clamped, the machine table pulls it through the broaches for removal of about 0.015 in. of stock from each angular face



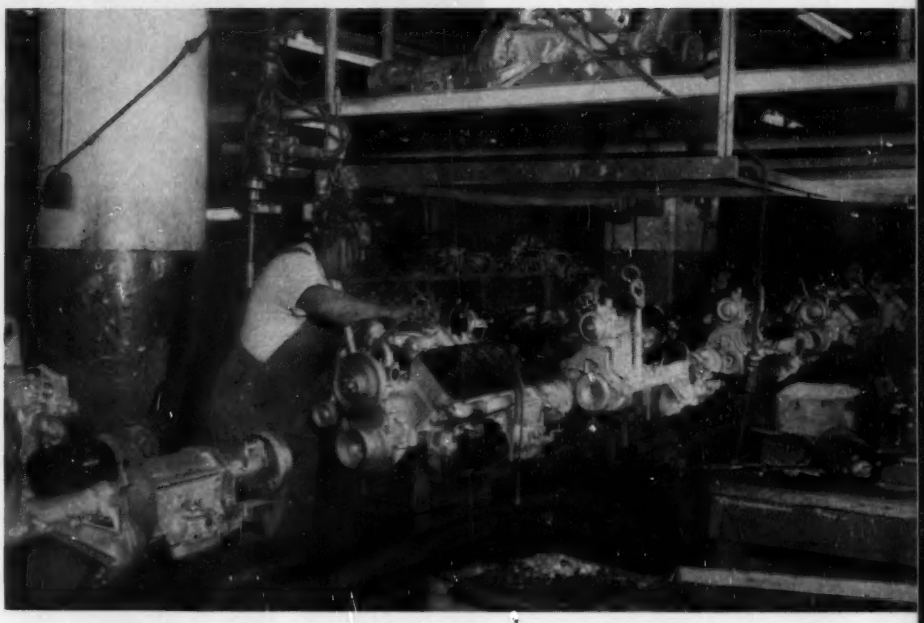
**ELEVATING FIXTURE** and transfer bar remove block from line and raise it into alignment with horizontal Simplex head for boring camshaft and crankshaft bearing holes. Work is first elevated, then transferred into machine, lowered and clamped. Boring head enters simultaneously with a Stoker-unit head which moves down to ream all oil-pump and distributor holes in line with camshaft. After retraction of the boring and reaming heads, the block is unclamped, raised, and moved out to the line again where it is lowered and continued on to the next operation



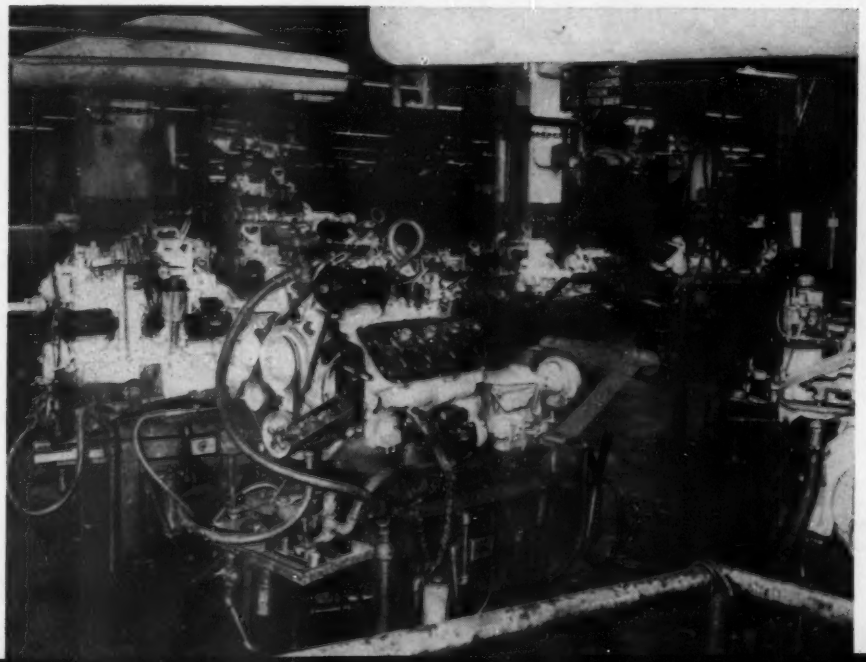
**TIP-UP FIXTURE** turns block over to locate from one end for finish-boring distributor and oil-pump holes and counterboring oil-pump pilot hole. Second fixture returns work to horizontal position with cylinder head face up. Heald machine has two side heads, one entering from each side of the block to insure alignment of holes within 0.002 in. A shuttle-type conveyor carries finished blocks to a Fitchburg machine where they are automatically indexed 90° and loaded for milling and line reaming



**SWINGING TRANSFER ARMS,** one at each end of a Micromatic hone installation, load and unload first one, then the other, of these machines. Two hones are situated opposite each other for super-finishing main bearings to 45 mu in., rms. First transfer arm follows a tip-up fixture that places the blocks an end. The arm picks the blocks up and loads one machine, then the other. After honing and inspection (Sheffield air gages), blocks are picked up by second arm



**ASSEMBLY** is likewise mechanized. Here distributor, generator, voltage regulator, spark plugs, carburetors and similar parts are added on a slot-type conveyor which carries engines from paint booth along the assembly line. Assembled engines are transferred overhead after test. This takes them to chassis line for installation in cars



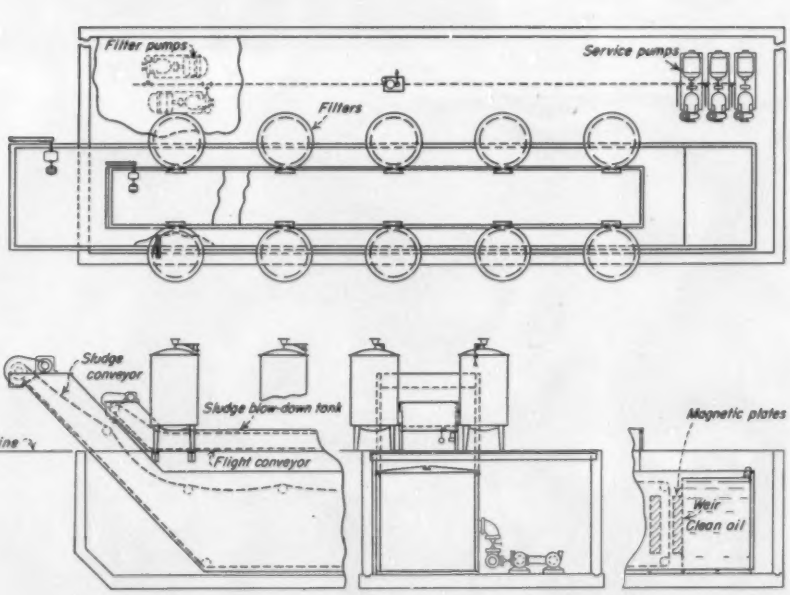
**ENGINES ARE TEST-RUN** on five circular turnblades, each with 16 test stands. Engines are run for 30 min. each, to check ignition timing, oil pressure, idling speed, carburetor adjustment, leaks, and similar elements. Overhead monorail brings engines to test from assembly, then takes them to installation point. Exhaust fumes are carried off by overhead blower system

# SAGINAW STEERING GEAR, GMC

## Thread-grinding oil reclamation

J A HUDSON
Supervisor Process Development
SAGINAW STEERING GEAR DIV, GMC, SAGINAW, MICH

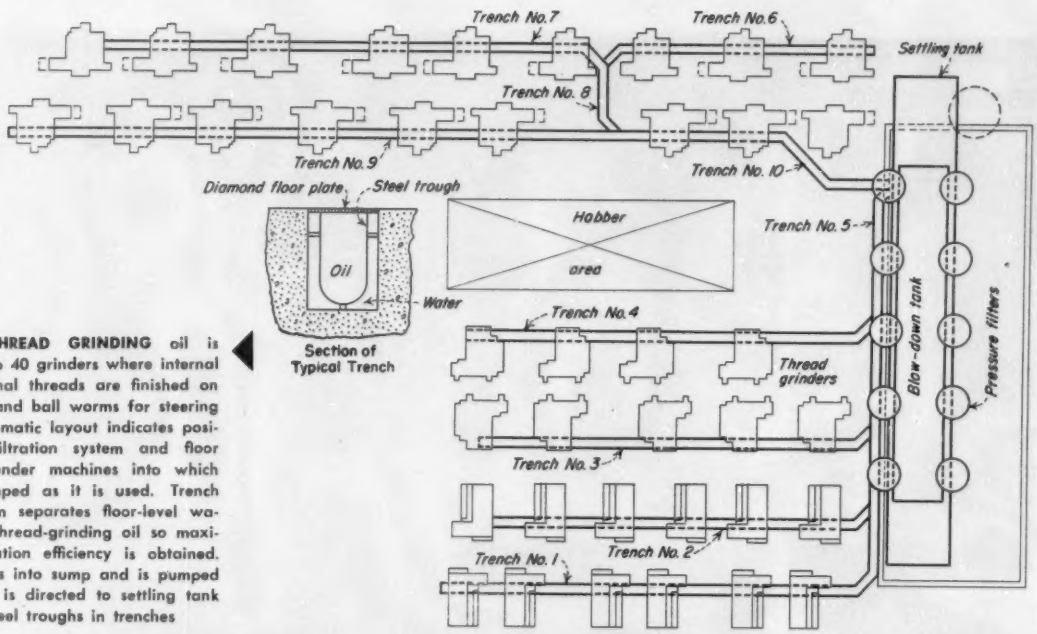
**PRESSURE FILTERS,** settling tank and blowdown tank are main components of filtration system that provides clean oil to a battery of 40 thread grinders at 1200 gpm. Settling tank has 14,000-gal capacity, 10 filters hold 363 gal each and have pumps each capable of delivering 150 gpm at 35 psi. Company engineers worked with C I Hoffman Machinery Corp experts to produce this system



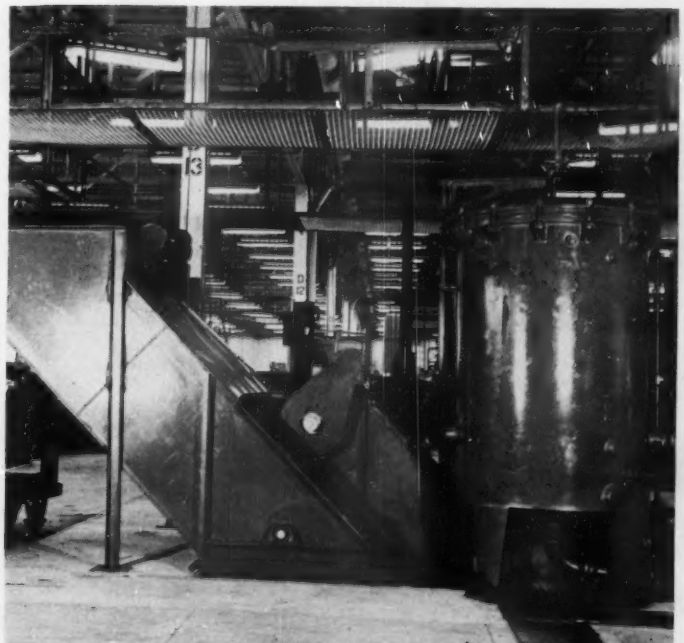

**OIL FROM GRINDERS** is partially cleaned in settling tank after 10-min. detention period to settle out major particles and passage over magnetic plates to remove fines. A conveyor scrapes magnetic plates clean and collects settled dirt in detention tank. Then it goes to filters where particles as small as 0.00001 in. are removed. Each filter is a welded-steel tank with a series of 19 fine-mesh metal screens. Screens are precoated diatomaceous-silica earth (a form of coral structure) automatically through control valves between precoating storage tanks and filter tanks, operated when pumps are started. Clean oil is pumped to machines in manifold leading to machines; sludge from filters goes into blow-down tank conveyor then to conveyor in settling tank which carries total accumulation of dirt to exit port and waiting chip buggy

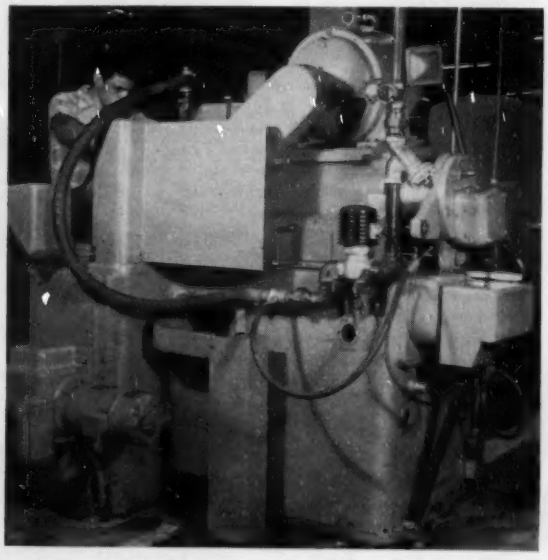
Servicing 40 thread grinders and handling oil at 1200 gpm, this Hoffman filtration system is said to be the world's largest. Cost of $98,000 is expected to be amortized in less than two years, based on experience with earlier units. Estimated savings were: 10% oil usage, 20% grinding-wheel and diamond usage, 20% scrap (from contaminated oil), 64% labor (less setups and maintenance). Production is expected to rise 40% as a result of reduced downtime for wheel changes and dressing. Experience thus far makes these estimates ultra-conservative, the 20% savings figures showing 85% thus far, for example.

Installation time was only 8 weeks from idea to operation. 12 J&L and 10 Ex-Cell-O internal thread grinders, and 18 J&L external machines, are served by the system. Each machine uses 25 gpm of Socony-Vacuum *Sultran* B4 with a viscosity range of 155SSU at 100 F to 450SSU at 65 F. Parts ground are ball nuts and ball-nut worms for power and manual steering gears.




**HEAVY THREAD GRINDING** oil is supplied to 40 grinders where internal and external threads are finished on ball nuts and ball worms for steering units. Schematic layout indicates position of filtration system and floor trenches under machines into which oil is dumped as it is used. Trench construction separates floor-level water from thread-grinding oil so maximum filtration efficiency is obtained. Water runs into sump and is pumped away; oil is directed to settling tank through steel troughs in trenches

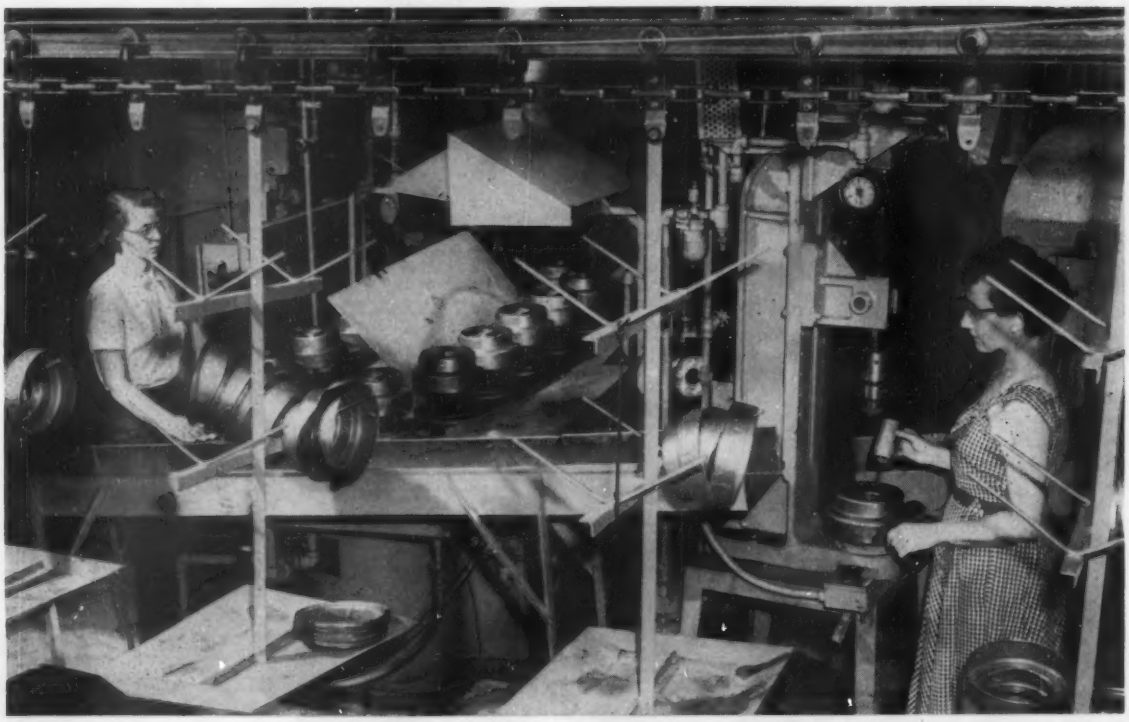




**NO OIL IS WASTED** at thread grinders where solenoid valve in overhead piping is energized when machines are started and stopped. This insures plentiful supply in operation and saves oil when machine is not in use. Cool oil is assured by high volume in system, no artificial source of refrigeration being necessary. Volume at each machine is at least 25 gpm and pressure is 35 psi

# SPARK PLUG, GMC

## Air-cleaner assembly

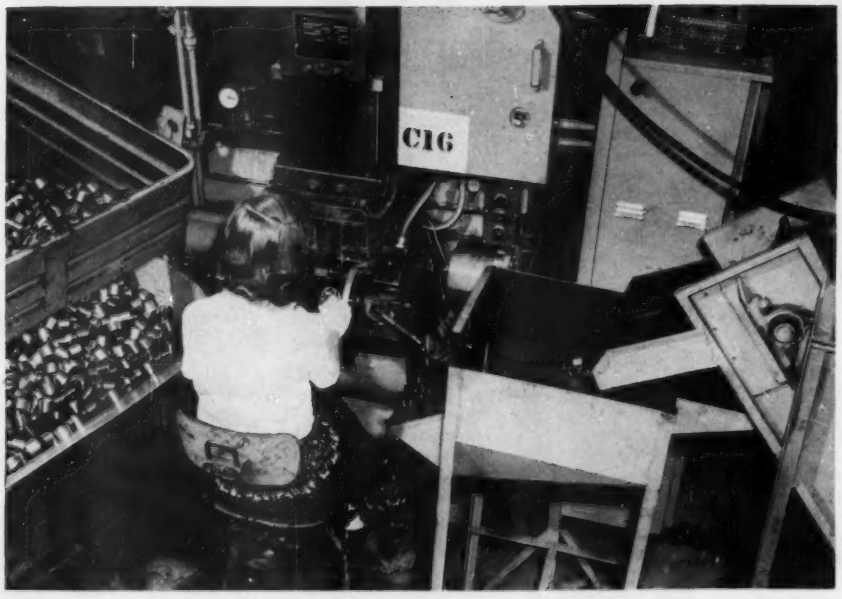


**AUTOMATIC SOLDERING TABLE** permits joining air-cleaner oil shells to carburetor connection tubes at 800 per hour. Components are carried to operator at air press, right, by monorail for pre-assembly of shells and tubes after which a chute delivers them to the soldering table. Here the second operator loads fixtures indexed to fine butane-gas-fired heads and rotated by a chain-driven spinner when they reach them. First two heads preheat the work, the other three maintain temperature while 0.092-in. solder wire with a resin core is automatically fed into the joint. A microswitch is actuated by a finger that contacts the work just in front of the soldering head so no wire is fed if a fixture is empty. When the soldered work is indexed back to the operator, it is loaded on the monorail for transfer to subsequent operations

**SPLIT CONVEYOR** with 4-point welder permits press fit and welding components together right in the line. Work is delivered to machine by riding up tracks, (adjustable for any height work) that lead to the next. The operator drops bridge studs and tubes, (supplied from chute at left) into center tube in work, then actuates machine for ram pressure and four spotwelds. Production rate runs about 500 assemblies per hour

**Ten different kinds of automobile air cleaners, for various makers, are produced on two new and highly flexible assembly lines of this GMC division at Flint, Mich. One line takes high-volume, long-run jobs, the other relatively low volumes, including spare parts. An overhead monorail feeds both lines from transfer presses. Special presses, automatic soldering setups, and other machines making up the low-volume line use the monorail only, maintaining a subassembly bank on it. Parts for the high-production line come from the monorail but are passed on as subassemblies on a 164-ft belt conveyor on which are 20 resistance welders (many special), 10 air presses, 8 special wire-mesh-element machines, 5 special canning machines for lock seaming and curling, numerous automatic fixtures, an automatic spray-painter, and a silk-screen setup for labeling. All machines have portable connections to simplify changes for various jobs or sequences—such as that for low-hood cars which use elbow-type cleaners with the silencer section curled to join the shell**

**CONVEYORIZED FEED** of components for pre-crimping prior to welding speeds assembly. Shell and oil-base assemblies are delivered to air press on one belt, left, chamber covers and tubes on the other. Operator loads cover and tube assembly in fixture and places shell and oil base on top. Press ram raises assembled parts to head where four tools crimp joining flange in chamber cover. Crimped parts are dropped on left-hand conveyor for transfer to welder where permanent joint is made




**VERTICAL INDEXING HEAD** on this special projection welder permits assembly of studs and tubes at 600 per hour. A stud from the right-hand bin is dropped in one of 6 fixtures in the head while a tube from the left is placed over the fixture. At each index four welds are made, (2 on each side of the assembler) and a finished part is delivered via chute to the main-line setup in the preceding photo

## SPARK PLUG, GMC

### Air cleaner assembly . . . continued

**SPECIAL 6-POINT SPOT WELDER** is supplied element retainers from monorail at left and baffles from bin at the right for joining at 550 per hour. Operator loads work on rails and shoves it into nest—welds and repeats. Second piece shoves preceding one out of the nest and into a curved chute that is also twisted to turn work over for following operations. Curve in chute directs work onto motorized belt conveyor

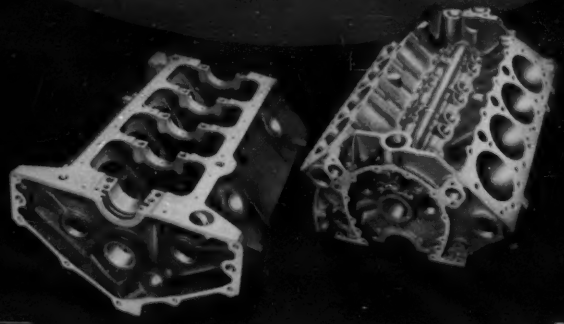
**PORTABLE ELECTRIC DRILL,** tied down two ways and actuated back and forth by an air cylinder under it, makes a fast clamp assembly fixture (600 per hour). Operator puts threaded stud in guide with "eye" end toward chuck in drill and at the same time places a clamp on the fixture. Holes in the clamp are aligned with the threaded end of the stud and with the end of a chute which delivers nuts from a Syntron vibratory hopper. Actuating the air cylinder moves the drill forward—rotating to drive the threaded end into engagement with a nut after passing through the holes in the clamp

**SPECIAL CANNING MACHINE** produces double-lock seam to simultaneously curl two edges of air cleaner, one on the chamber cover and one on the element cover. First station has a set of start and finish rolls for each of these seams. Second station has a rotating spring-loaded head that clamps work and spins a locknut down into full engagement in the assembly. Rams at the two heads are actuated by a microswitch on a cam under the table. Same cam controls microswitch to start air motor when second ram starts down for spinning wing-nut, eliminates air waste. Operator merely loads and unloads 6-station indexing table to obtain about 550 assemblies per hour

**ROLLS AND A SPRING-LOADED SWIVEL FIXTURE** locate an air cleaner for accurate alignment with threaded end of stud on a clamp to which it is spot welded. Rolls permit easy rotation of cleaner to position seam relative to thread, (for best clamping action after weld is made) while spring fixture holds it in place. Fixture is depressed to lower cleaner tube over center of welding head where clamp has already been located. Cleaners are taken from chute, above rolls and, after spotwelding clamps at 500 per hour, are loaded on monorail which carries them into an automatic painting setup

*Another Transfer-matic by Cross*

# 350 Foot Automation Line Performs 555 Operations on V-8 Cylinder Blocks



- ★ 100 pieces at 100% efficiency.
- ★ Operations: 265 drilling, 6 milling, 21 boring, 56 reaming, 101 countersinking, 106 tapping, and 133 inspection.
- ★ 104 stations: 1 for loading, 53 for machining, 7 for part handling, 6 for mechanical inspection, 36 for visual inspection, 1 for unloading.
- ★ 5 independent machine sections with provision for banking parts between each section; master automatic cycle for operating all 5 sections simultaneously.
- ★ Capacity for removing work piece at every station.
- ★ Automatic independent transfer mechanism for each machine section and automation units for handling parts from machine section to machine section.
- ★ Automatic air pressure test for high pressure oil holes and automatic depth inspection for all holes before tapping.
- ★ Pre-set tooling throughout.
- ★ Other features: Coolant system for tapping section, complete interchangeability of all standard and special parts for easy maintenance, construction to J.I.C. standards, hardened and ground ways, hydraulic feed and rapid traverse, automatic lubrication, automatic chip disposal.

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THE CROSS CO.

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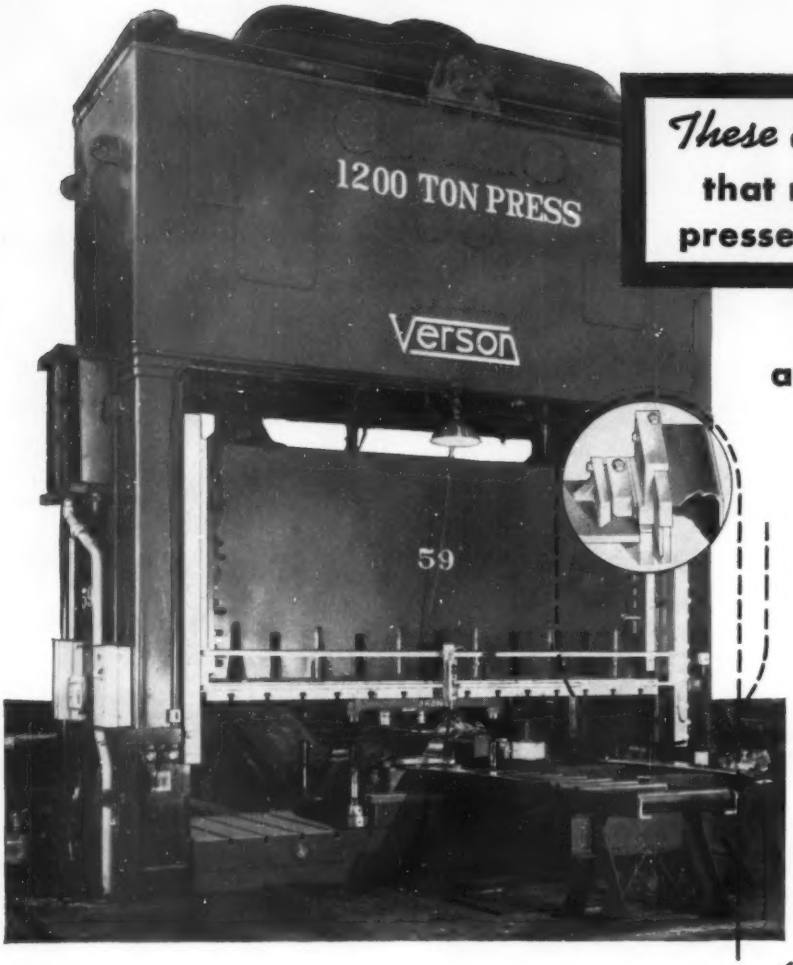
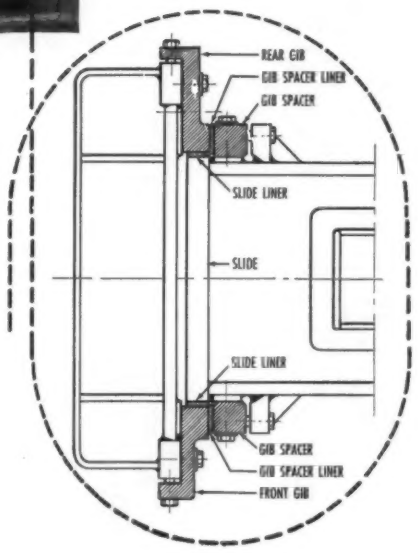
*Special* MACHINE TOOLS




## *These are the features* that make "Verson" presses your best buy

**Extra long, adjustable, square gibbing of "Verson" Presses assures accuracy and long press and tool life**




Quality has to be designed and built into a press—it can't get there by accident. A good example is the gibbing of Verson presses. It is extra long to provide accurate guidance of the slide right to left and front to back throughout the stroke. It is adjustable in both directions to make it possible to maintain precise accuracy at all times. To assure peak efficiency at all times, gib bearing surfaces are ground to a mirror finish.

For the user, the design of Verson gibbing means better press performance and longer life for both press and tooling. It all adds up to better stampings at lower overall cost.

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# Die-Setter's Manual...I

EDWARD P BOEHNLEIN, Tool & Die Division, Standards Dept, CENTURY ELECTRIC CO

This manual was prepared after a study of die failures and subnormal production runs indicated that in a number of cases the fault could be traced directly or indirectly to the way in which the die was set in the press.

The die setter is a key man in proper functioning of a press room. Rules and suggestions set forth in the manual are not new or novel: they are restated for the benefit of the less experienced men and for re-education of others who have lost sight of the basic principles.

A manual of this kind is essential in any large press room, and in even small ones for that matter. The die setter has much responsibility. Through carelessness or inattention, he can damage or ruin tools and machines worth many thousands of dollars and tie up production of needed parts. In fact, if the shop is doing contract work, a smash-up traceable to carelessness can actually damage the company's reputation.

The manual describes the tools the die setter should have, his responsibilities, and the steps in setting several kinds of dies.

## MINIMUM TOOL KIT

Each die setter is expected to have the following minimum variety of tools:

- Readable 6-in. scale
- 6-in. adjustable wrench
- 8-in. stilson wrench
- At least one pair of pliers
- Set of screw drivers
- Complete set of Allen wrenches
- Lead- or balsa-faced hammer
- Pocket flashlight
- Thickness feeler gage
- 10-in. flat mill bastard file
- 6-ft. steel measuring tape
- Suitable tool chest

## DIE SETTER'S RESPONSIBILITIES

1. It is the duty of a die setter to keep a continual check on all wrenches, bolts, nuts, washers and clamps supplied by the company for use in clamping dies in the presses. He should see that the wrenches fit the various bolt heads; that the bolts are the required length, with good clean threads, not bent or twisted; that the nuts have not been battered so badly that the wrench no longer fits or that the nuts do not pull up flat on the face; that the washers and clamps are not bent or distorted; that there is a neat orderly place to keep these parts when not in use on the presses. The supervisor should be told about any conditions that are unsatisfactory, to avoid costly repairs.

2. It is a die setter's duty to check the bolster plates and ram face of the punch presses at intervals, to see that no nicks or slugs are on either face. If so he should carefully use the 10-in. mill file to remove same. He should check the tapped holes or T-slots in the bolster plate to determine whether they are filled with dirt or slugs and remove same. With these simple precautions, he will find that his own job will become more pleasant, and dies will stay put after they are once clamped in place.

3. Although the die setter is not expected to be a press repair man, he should consider it to be part of his job to check, while the operator is running the press, to see that the clutch, brake, air or pedal adjustments have not become loose, and certain bolts and nuts have not worked off altogether. If faulty conditions are noticed, they should be brought to the attention of the supervisor or maintenance man.

4. All dies removed from the die-storage racks should be ready to operate. Through lack of care in the die-repair department or handling in the die racks, this is not always the case. The die setter should therefore strive to acquaint himself with the design of the dies he is setting, so that he may be able to detect a loose nest or guide-ring, screws that are extruding or missing altogether, burrs and sharp edges where they should not be, and dull edges that should be sharp. Again, a word in the proper place will help to remedy these situations, as well as to absolve the die setter of blame if the die fails to function properly.

5. The die setter's responsibility does not end when he has the first piece inspected, and the operator begins to work. It is his duty to check the pieces periodically to see that they are still satisfactory and not wait until a few thousand pieces are made with a chipped or broken punch.

6. The die setter should be the first person to detect any change in the grade, shape, size or thickness of the material being fed into the die, and should report the same immediately.

## SETTING 2-PIECE OPEN BLANKING OR PERFORATING DIES

STEP 1. When dies are small enough for one man to handle safely, it is good practice to try to fit punch and die members together before clamping in the press. There is always a chance of misalignment in open dies caused by handling or in the storage racks.

STEP 2. Check punch shank and top face of punch-holder for dirt or burrs and remove same. Remove ram clamp. Always use special care in handling the ram clamp; any nicks or burrs on either face or in the V-slot of the ram clamp can cause misalignment of the dies. Place a suitable wood block on bolster plate to support punch.

Bring down ram of press low enough to allow sufficient room to slide punch member carefully into the V in the ram. Replace ram clamp and tighten both nuts equally by hand. Bring down ram slowly with ram adjusting screw, until you

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Forgings of irregular shape or castings that are hard to chuck are ideal parts for Sunnen Honing, because costly fixtures are eliminated. You can produce any accuracy you need from extreme precision to simple de-burring—with surface finishes as low as 2 micro-inches RMS—in diameters from ⅛" to 2⅝".

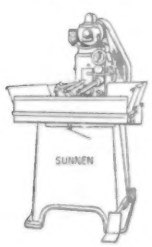
Average installation costs under $1,000—delivered and in operation within 3 weeks. Our field engineers continue to serve you year-'round, without charge. Write for more information.

# Product Improved... Production Increased

## *Honed Gage Bracket Sets Accurately, Slides Without Chatter... Set-up and Tool Sharpening Time Eliminated in Production*

**PROBLEM:** To be sure of a product that meets their standards of quality, the B. C. Ames Company specifies no out-of-round, taper, or mis-alignment of tandem holes in this cast iron offset bracket with ⅛" saw slots. Hole sizes are 1.000" and 1.250". Surface finish must be smooth to permit friction-free, chatterless sliding of bracket on post.

**SOLUTION:** Sunnen Honing easily holds the tolerance—produces better parts in less time than was possible with special expansion reamers. Production tie-ups (caused by slow delivery of special tools) have been eliminated. Production rate of 12 parts per hour—24 tandem holes—meets requirements. Ames now has a better, smoother operating bracket at less cost.

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# Die-Setter's Manual...II

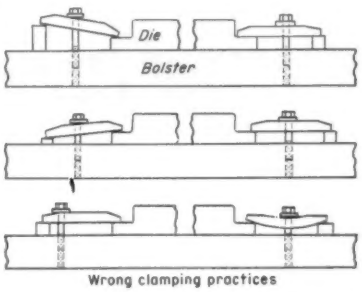
are positive that the ram face and punch-holder face are together over their entire surface. Now tighten ram clamp nuts with wrench, gradually tightening one and then the other until they are both snug. Note: Never tighten one nut only, because this will not only spring the ram clamp studs, but the whole punch shank is likely to slip loose on the first impact stroke of the press.

Raise ram with adjusting screw to remove wood block, then bring press to bottom center of stroke and wipe bolster plate clean. Adjust stroke by hand to allow enough room to slide die in place.

Note: Large punch members usually have auxiliary bolts which come through the ears on the press ram to help support the punch. The same general procedure is followed, as before, with this addition. At the time the punch member is put in position in the ram and the ram clamp put in place, these bolts must be lined up through the ram ears and screwed in place by hand, making sure that they have sufficient clearance to prevent binding. Then after the ram clamp nuts are completely locked in place, these bolts are finally made snug.

STEP 3. Check bottom of die for dirt or burrs and remove same. Carefully position die on clean bolster plate and enter punch into die with ram adjustment screw. On a die that has 0.003 in. or less total clearance between punch and die, in an upright press, you are now ready to clamp the die in position. In case of more that 0.003 in. clearance, the punch must be backed out of the die carefully with the ram adjustment screw, and a number of strips of paper, silk or rag of the approximate required thickness to compensate for the clearance are placed equally around the periphery of the cutting edge of the die. The punch is now reentered into the die with the ram adjustment screw, and checked to see that none of the strips have been sheared off. If you find a few sheared off on one side it signifies the die is not in alignment and you must repeat the operation.

The same procedure is followed on an inclined press with the exception that the die must be lightly clamped to the bolster to prevent it from sliding when you back out the punch.

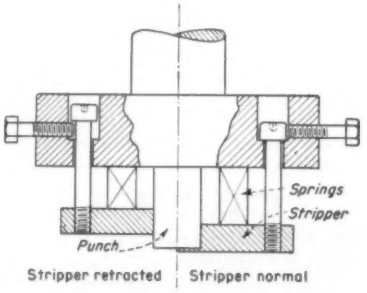


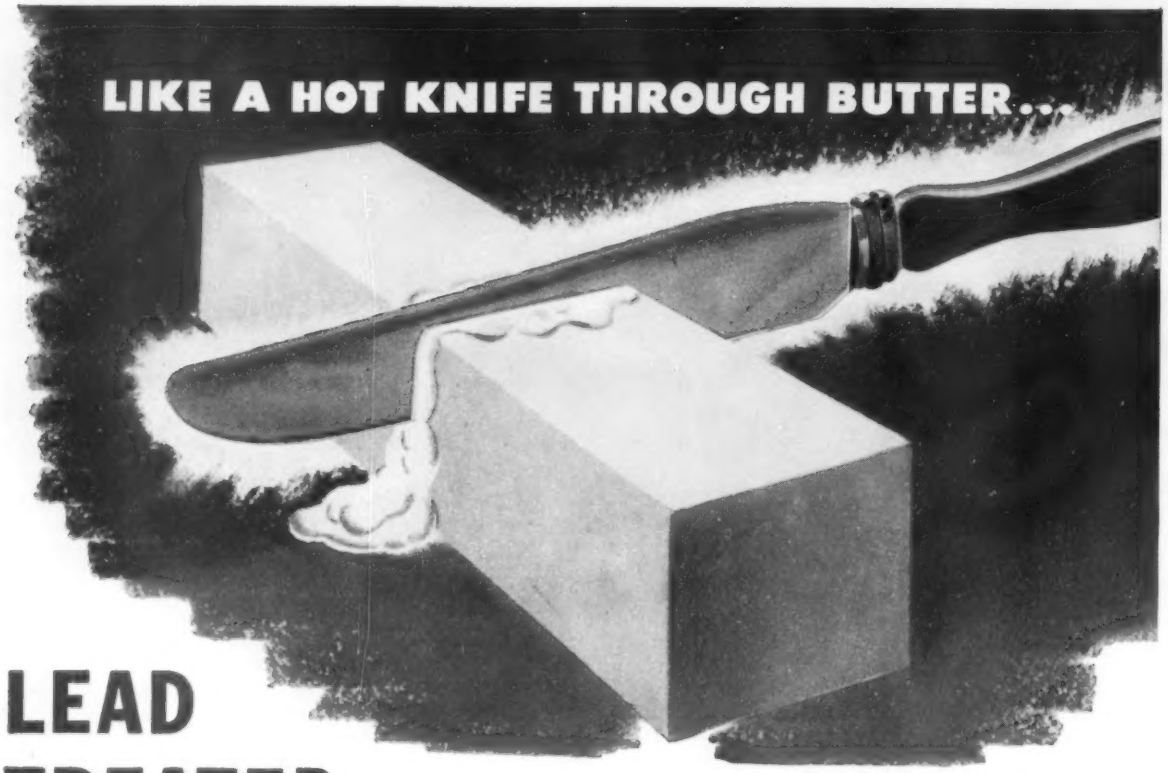

Select the proper clamps, bolts, washers and clamp heels. See that the clamps are not too long, or they may bear against the wall of the clamping area of the die, and shift it in tightening. They may be too short and only hold on the edge, causing them to slip on the impact of the press. Check the riser heels under the clamps to be sure that they are slightly higher than the clamping surface of the die. Whenever possible the distance from the center of the bolt to the heel should be greater than the distance from the die to the center of the bolt. If either or both of these conditions do not exist, you will be applying your clamping pressure to the bolster plate and not on the die.

See that your bolts are the required length, so that in drawing them down, you apply the pressure under the head of the bolt, and not on the threads in the bolster plate. As a general rule, it is better to use an extra clamp than have one clamp too few. After all clamps are in place, tighten each one lightly and then gradually pull up each one equally, going around a few times to be sure that they are all snug.

Back the punch out of the die with the ram adjustment screw, and then re-enter it to the desired cutting depth, making sure that the press is at bottom center of stroke. Approximately 1/32 in. is sufficient for the punch to enter the die, except in cases where the stock is exceptionally heavy, or the press has considerable lost motion. In either case, lower the punch until it just cuts through. As a general rule, never enter a punch into a die deeper than is necessary, because it can cause serious damage if it should shear, and be dangerous to the operator should a punch chip or break. After taking all loose wrenches, tools, bolts, washers, etc. off the press bed, you are now ready to turn on the power and try out the die.

Note: in cases where dies have spring-loaded strippers attached to



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# Die-Setter's Manual...III

the punch member, or where the die has a solid stripper that will prevent the punch member from entering clean through the die, Steps 1 and 2 can be combined, by eliminating the wood block to support the punch member. Instead, assemble the two members and slide them on the press bolster as a single unit. After this, the procedure would be the same through both steps.

It might be well to explain the usual design and proper handling of a spring-loaded stripper on the punch member of a two-piece die. In general, the assembly consists of a spring-loaded plate through which the punches extend. This plate is held in position with three or more filister-head screws in countersunk holes through the back of the punch holder so the holes are countersunk deep enough to allow the plate to slide from a position of approximately 1/16 in. in front of the punch, to a position where the punch extends 5/16 in. beyond the plate. Provisions are usually made to retract this plate and lock it there by means of side screws in the punch holder. By retracting the stripper plate sufficiently for the side screws to get under the heads of the stripper screws, the plate is locked with the punches extending beyond the stripper for setting the die.

Serious damage often results from using improper methods of retracting or releasing the stripper plate. If it is not retracted evenly, or if one screw is released while the plate is under pressure, the alignment of the punch member suffers, or one or more punches can be snapped off.

In retracting the stripper, the punch holder should be placed in an arbor press and suitable parallel blocks should be placed on the face of the stripper. Care should be taken that these blocks clear all punch edges when they extend through the plate. Uniform pressure should be applied to these blocks, and the stripper retracted far enough to let the side screws slide freely under the filister heads. If you cannot do this, notify your supervisor.

He will have the punch repaired, because the springs may be too long, the screws too tight, or some obstruction is present.

In releasing the stripper after the die is lined up in the press, again use proper parallel blocks between the die and stripper plate. Bring the press over by hand until these blocks take up all the spring tension. Then turn out the side screws until they clear the countersunk holes, finally back up the press by hand and remove the blocks under the die.

### SETTING SUB-PRESS DIES

In setting a sub-press die (die mounted in die set) the same basic procedure is employed as with a two-piece die. The upper section or punch member is tightened in position first, and then the lower member is clamped to the press bed. Points requiring special care are:

1. Because of their size, sub-press dies are more likely to accumulate dirt, nicks and burrs, and therefore must be checked more thoroughly than other dies. Unless they have a strap of some sort to hold the two members together, never attempt to lift one by the upper member alone. If such a strap is provided, be sure to remove it or lock it out of the way after the die is on the press bed, before you attempt to set the die.

2. Keep the leader pins clean and well lubricated. Make a periodic check while the press is in operation to see that the pins are not running hot or dry.

3. Any blanking or perforating die must have a clearance hole or holes through the bolster plate to clear slugs or blanks and the die setter must check their existence. This is doubly important in the case of a sub-press die, because, due to design, it is difficult at times to judge from looking at the top of press whether all the holes are clear. Therefore, the safest practice is to crawl under the press bed and check with your flashlight whenever possible. There have been thousands of dies seriously damaged, because the die setter "thought" all holes were clear.

4. Many sub-press dies are designed with positive instead of spring-loaded strippers. Again care must be taken in setting the die to see that the knockout plate works freely in the press ram, and that the knockout mechanism of the press is adjusted and locked in position.

5. The purpose of the leader pins is to keep perfect alignment between the punch and die member at all times whether in or out of the press. This may not always be the case, due to looseness of the leader pins, or misalignment of the press ram. Therefore, it is considered good practice when setting a sub-press die, to have the ram at bottom center of the stroke, with the punches entered the desired depth in the die, and with the upper member fastened snugly to the ram, before clamping the lower member to the press bed. This practice serves a two-fold purpose; it not only assures perfect alignment of punch and die members, but also prevents an error in setting the depth of the press stroke. Many a sub-press die has been set with the press ram in another position than at bottom center of the stroke, and when power was applied to the press, serious damage resulted.

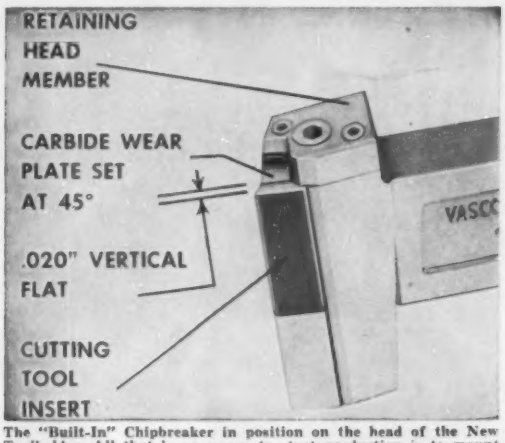
*(To be continued)*

(Advertisement)

# CHIP CONTROL WITHOUT CHIP BREAKER GRINDING

Everyone is aware of the problems that are encountered in high-speed machining with carbide tools which have no chipbreakers. Everyone is equally aware of the problems of development of the correct ground-in chipbreaker for different cutting speeds and depths of cut, factors which influence the ground-in chipbreaker.

To eliminate the problems of grinding and other problems which occur when ground-in chipbreakers are used, the Vascoloy-Ramet Corporation has designed a toolholder




**The "Built-In" Chipbreaker in position on the head of the New Toolholder. All that is necessary to start production is to mount the toolholder.**

with a "Built-In" chipbreaker plate as a part of the toolholder. This "Built-In" chipbreaker plate eliminates all chipbreaker grinding and is usable when cutting a wide variety of materials over a wide range of feeds and speeds. Because the Chipbreaker plate is in intimate contact with the cutting tool insert, it removes some of the heat generated during the cut and thus prolongs cutting tool life, as well as eliminating chipbreaker grinding. The "Built-In" Chipbreaker Plate is an assembly of the retaining head member, made of steel, with a tungsten carbide wear plate to act as a chipbreaker. This carbide wear plate is set at 45° to the top surface of the cutting tool insert with a .020" vertical flat provided at the bottom edge for additional strength. No adjustment or re-grinding of the wear plate is necessary once the toolholder is properly in service. The life of the Chipbreaker plate will, of course, depend on the severity of the cut but the replacement cost per cutting edge of insert is negligible.

The chip control width (distance from the cutting edge of the cutting tool insert to the .020" flat) of the Vascoloy-Ramet Toolholder is designed for chip segmentation in the direction of larger rather than small curl radii. This is important because the ideal condition occurs when chips are curled to the maximum radius at which they will still break since additional power is required to curl a small radius and additional wear results. The wider chip control width of these Toolholders also prevents "crowding" of the chip, and the chip pressure which results from tightly curled chips is reduced. All of the chipbreaker plates have been designed to operate most efficiently when there is a 1 to 9 ratio of feed rate to chip

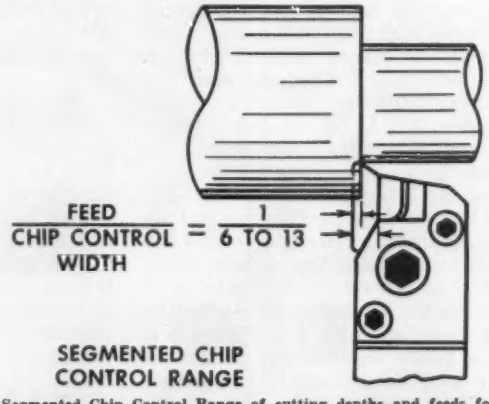
**Segmented or broken chips produced over a wide range of feeds and depths of cut with a "Built-In" Chipbreaker Plate and a New Vascoloy-Ramet Toolholder.**

control width, however, the chipbreaker plate will maintain proper chip control over considerable variation of cutting depths and feeds, something not possible with the ground-in chipbreaker. When cutting most materials, segmented

**Actual photograph of the "Built-In" Chipbreaker Plate on the New Vascoloy-Ramet Toolholder showing proper chip control by breaking the chip against a solid surface. Notice the large curl radius of the chip which is desirable because it requires less power to curl a chip with a large radius.**

chips will be produced with the chipbreaker plate, if the ratio of feed to chip control width lies anywhere between 1 to 6 and 1 to 13. Below 1 to 5, there will be high pressure, excessive wear and danger of failure. Above 1 to 13, the chip may tend to curl or ball.

The Standard Chipbreaker Plate on the Vascoloy-Ramet Toolholder is of the parallel type, that is, the .020" flat is parallel to the cutting edge of the insert. In some rare cases, in order to obtain a broken chip an angular chipbreaker plate, with the .020" flat forming an angle with the cutting edge of the carbide insert, may be necessary. This type of chipbreaker plate is easily made by grinding a slight modification on a Blank Chipbreaker Plate. Blank Chipbreaker Plates are available as standards. This modification will then produce a secondary chip direction that will break the chip against a work shoulder or a solid surface.




**Segmented Chip Control Range of cutting depths and feeds for a "Built-In" Chipbreaker Plate and New Toolholder. A range not possible with a ground-in chipbreaker.**

Further information on the elimination of chipbreaker grinding and chip control with the "Built-In" Carbide Chipbreaker Plate may be obtained by writing the Vascoloy-Ramet Corporation, 816 Market Street, Waukegan, Illinois.

# Talking Shop . . .

### Engineer Analyzed

STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, NJ, has just questionnaired its 5300 living alumni. A total of 67% are now in policy- or decision-making posts in industry, including 19% as presidents, veeps, or owners. 78% of graduates out of college five years or more are in executive or supervisory jobs. BUT, 18% of the graduates are in banking, finance, insurance, law, or some other remote profession — although all but 5% would again take engineering if they had it to do over. Of engineers' time, 43% is spent in research, design, and development, 17% in management, 13% in production, 14% in sales engineering. Some 10% of alumni earn more than $5000 within a year, 64% within three years. After 15 years, 40% have incomes over $10,000 (some as high as $25,000). By retirement, 46% are making over $15,000 a year, 39% over $20,000. Some 23% are active in the arts in their spare time, 53% in civic affairs.

### High-Rake Results

CONCLUSIONS in a limited test of high-angle HSS cutters on oil-hardening tool steels at the Taft-Peirce Mfg Co, Woonsocket, RI, are:

1. Both feeds and speeds can be increased perhaps two or three times those with standard HSS cutters. (Carbide cutters did not work effectively on oil-hardening tool steels.)

2. Horsepower requirements are somewhat less than those with standard HSS cutters, considerably less than those for equivalent stock removal with carbide cutters.

3. Equipment must be in first-class shape, with all available supports utilized.

4. Operators must be unusually alert, for danger of damage to both work and cutter are substantial. A very large stream of coolant must be directed on cutter and work at all times; a few seconds of inadequate cooling brings almost immediate burning of work, cutter or both.

### Conveyors

A RECENT CONVEYOR, designed originally for the bottling industry, can elevate parts at 400 per minute. . . . A table-type conveyor, used in finishing operations, rotates the part 360° on either or both axes while carrying it along . . . a heavy-forging conveyor brings parts to machines, includes storage banks, and has an overhead loop to take overflow. The setup includes a number of mechanized gaging operations. . . . A "pushbutton warehouse" has all stocks on conveyor units. Pushing a button moves the stack out so the required number of unit loads can be taken off the stack, then the stack is returned for restorage and the required stock moved to the desired area—all automatically. . . . Otto Svoboda of E W Buschmann Co, Cincinnati, mentioned these as recent developments in conveying before the Material Handling Institute fall meeting.

### Make Our Own Standard

"WE CANNOT HAVE a standard of living in America higher than our ability to outproduce other countries," said Edwin Smith, president of Seneca Falls Machine Co recently. "With our higher wage rates and higher costs generally, we can compete in world markets only by producing so much faster that the price differential created by their lower standard of living is equalized or surpassed. Currently, for example, it appears advisable to import at least parts—in some cases, whole machine tools—rather than to make them ourselves in this country. We are entering a period in which cost is the major criterion, not availability, and costs are currently lower on some parts if we bring them in."

### Piercing Punches

BACK IN WW I, armor-piercing projectiles were pierced hot for an explosive charge. In one plant, the best tool-steel punches, hardened to the limit, produced about 100 pieces before they developed orange-peel cracking on the surface and required regrinding. Eventually, it was discovered that this was caused by core failure. A tough, high-alloy gear steel proved to make a better punch because it could be made the same hardness all the way through. Such punches would produce about 5000 pieces . . . At the same plant, the best lubricant for piercing punches was found to be a 50-50 mixture of table salt and coal. The heated billet (1700 F) was tapped with a bar to get scale off the end, then a tablespoonful of the mixture dropped in the center and the punch brought down. Best coal for the process was coke or cannel coal, powdered, because of its greasy and soft, easily crushed structure.

### No-TV Land

ACCORDING to Jack Kleinoder, gm of John Volkert Metal Stampings, recently returned from Europe, a radio worth about $80 in the US costs 400 D-marks in Germany—some four weeks work for a toolmaker. A 19-in. console TV set costs 2000 D-marks, or almost half a year's work. TV broadcasting schedules are only 4 or 5 hr a day, so there is little incentive to buy a set. The cost differential lies in our high-production methods, even though our wages are 3 to 5 times as high. Only the Swiss worker has working conditions comparable with ours; in Germany and Austria the standards are what they were here 25 years ago, and plants are quite archaic, although larger ones are rapidly improving.

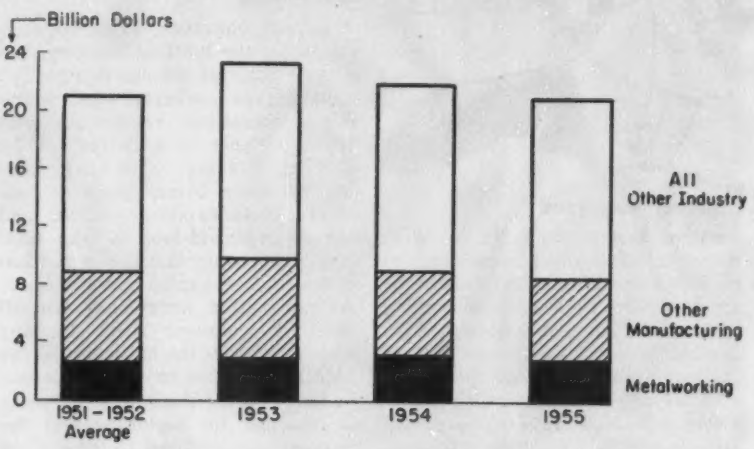
### Shipping Room

THE MOST IMPORTANT DEPARTMENT in a machine-tool plant is the shipping room, according to Ed Smith, president of Seneca Falls Machine Co. "If that's busy," says he, "everything is all right!" That's a principle applicable to other than machine-tool plants. Contrary to popular opinion on the part of labor, the healthy plant is not the one who gets work *in*, but the one who gets it *out*.

# NEW PLANT AND EQUIPMENT:

## US Industry Will Buy 5% Less Next Year, But More in '56

**That's the finding of a McGraw-Hill Economics Dept survey of industry's planned expenditures for the next two years. Most industries, including Metalworking, will tighten their pursestrings next year — but they'll loosen them in 1956**




**COMPARATIVE US CAPITAL SPENDING 1951-1955**

NEW YORK — By normal standards, 1955 will be another year of high capital spending, with expenditures of all US industry expected to decline only 50% from this year's $21.8 billion, according to a new preliminary survey just released by McGraw-Hill's Dept of Economics.

Within this framework, manufacturing companies expect to spend 7% less on new capital goods than they did this year. And metalworking firms will cut their spending by 17%, but it must be remembered that metalworking spending on plant and equipment hit an all-time high this year, whereas most industries did their top spending in the boom year of 1953. Actually, metalworking capital goods spending will be much the same as it was in 1953, and higher than the average for 1951-52.

Of the metalworking industries, only the automobile industry will cut capital spending sharply in 1955. Producers of transportation equipment (aircraft, railroads, ships) will spend less in 1955, as will makers of electrical machinery. Machinery manufacturers will reduce their ex-

## US CAPITAL SPENDING WILL BE OFF 5% IN 1955

| Industry | Millions of Dollars 1953 (actual) | 1954 (estimated) | 1955 (planned) | % change 1954-55 |
|---|---|---|---|---|
| METALWORKING | $2492 | $3235 | $2683 | —17 |
| Machinery | 803 | 694 | 688 | — 1 |
| Electrical Machinery | 481 | 461 | 436 | — 6 |
| Automobiles | 1000 | 1350 | 811 | —40 |
| Transportation Equipment (including aircraft) | 168 | 160 | 132 | —17 |
| Other Metalworking | 490 | 570 | 621 | + 9 |
| PRIMARY METALS | 1634 | 1134 | 1145 | + 1 |
| Iron and Steel | 1189 | 830 | 805 | — 3 |
| Nonferrous Metals | 445 | 304 | 340 | +12 |
| CHEMICAL PROCESSING | 3162 | 3011 | 2943 | — 2 |
| Chemicals | 1559 | 1328 | 1269 | — 4 |
| Paper | 431 | 448 | 423 | — 6 |
| Rubber | 158 | 133 | 121 | — 9 |
| Stone, Clay, Glass | 339 | 335 | 413 | +23 |
| Petroleum Refining | 676 | 767 | 717 | — 7 |
| FOOD AND BEVERAGES | 818 | 764 | 686 | —10 |
| Food | 525 | 499 | 548 | +10 |
| Beverages | 293 | 265 | 138 | —48 |

| Industry | Millions of Dollars 1953 (actual) | 1954 (estimated) | 1955 (planned) | % change 1954-55 |
|---|---|---|---|---|
| TEXTILES | 351 | 290 | 288 | + 5 |
| ALL MANUFACTURING | 10,026 | 9249 | 8598 | — 7 |
| PETROLEUM INDUSTRY | 4600 | 4875 | 4920 | + 1 |
| Production | 3100 | 3261 | 3473 | + 7 |
| Transportation | 450 | 391 | 285 | —27 |
| Refining | 675 | 767 | 717 | — 7 |
| Marketing | 325 | 374 | 375 | 0 |
| Other | 50 | 82 | 70 | —15 |
| MINING | 506 | 380 | 311 | —18 |
| Coal | 264 | 204 | 121 | —40 |
| Iron Ore | 74 | 61 | 53 | —13 |
| Nonferrous | 115 | 73 | 85 | +17 |
| Non-Metallic | 53 | 42 | 52 | +24 |
| RAILROADS | 1312 | 851 | 767 | —10 |
| OTHER TRANSP, COMMUNICATIONS | 2954 | 2922 | 2640 | —10 |
| ELECTRIC & GAS UTILITIES | 4548 | 4274 | 4206 | — 2 |
| ALL INDUSTRY | 23,271 | 21,784 | 20,727 | — 5 |

penditures only 1%. On the other hand, producers of fabricated metal products, instruments and ordnance actually expect to increase their purchases of plant and equipment 9% in 1955.

Capital spending by all industry in 1955 is expected to run very close to current (fourth quarter 1954) levels. This suggests that an upturn in capital spending isn't too far away. The survey appears to confirm at least a leveling off in capital spending next year, because 76% of the firms surveyed say they will spend the same amount or more in 1956 than they will in 1955. A majority of surveyed companies (55%) expect the same level of spending in both years, while 21% indicate they will spend more.

Metalworking companies are looking forward to 1956 as a year for increased capital spending. Nearly one-fifth of the firms surveyed plan to spend more in 1956 than in 1955. About 6% indicate they will spend the same, and only 17% less.

Some two-thirds of the companies surveyed expect higher sales in 1955 than in 1954 — less than 10% expect lower sales. But in the metalworking industry, expectations for next year are less optimistic — with 53% looking forward to higher sales, 33% the same, and 14% less sales.

# AIEE TALKS MACHINE TOOLS:

## And the Emphasis Is Still on Automation

**Over half the papers at AIEE's Special Conference on Machine Tools dealt with automation in one way or another. Other topics mulled over by the electrical engineers: how to prevent machine tool failures, more reliable electronic controls**

DETROIT: Instrumentation, electronic and electric controls and their relationship to automation were the major discussion topics at the Seventh Annual American Institute of Electrical Engineers' Special Conference on Machine Tools, held here October 25-27. Half the papers presented dealt with phases of electrical engineering as related to automation. Subjects ranged from current problems and needs of automation along electrical lines, to electronic inspection equipment.

### Outlook for Automation

Automation was defined by P H Alspach, General Electric Co, as continuous automatic production on a sound, economical basis. Mr Alspach said that the US will consume products at twice its present rate by the end of the next decade, but that the US labor force will grow no more than 11% during that time. Automation, he said, is the only way to overcome the problem, and this can only be achieved successfully by careful planning and progressive upgrading of both plant and work forces. Improved processes, more automatic equipment, and skilled labor will be necessary with the era of automation, he said, and its effects will be felt on all business, not just the engineering and manufacturing industries.

M M Arlin, Arlin Products Inc, Detroit, cited a new industrial trend — cybernetic controls (integrated mechanisms made up of electronics, hydraulics, optics and even pyrometry) coordinated to permit high-speed computations and automatic action to match computed definitions. Cybernetic control, Mr Arlin said, can do a thinking job that doesn't necessarily follow a fixed pattern. We have just scratched the surface of the possibilities of modern electronics as applied to automation, he concluded.

### Automatic Checking Devices

Norman K Conrad of Ford's Cleveland Engine Plant said his plant has electrically controlled, interlocked systems that allow hundreds of operations to be carried out by lines that operate like single huge machines. In these lines, he said, are positioning fixtures not only interlocked with the machines but within themselves. Automatic checking devices, he said, are built into the machines to inspect parts automatically, and to stop the line automatically when rejects are found, or when worn tools need replacement.

Ralph E Cross, Cross Co, Detroit, speaking on instrumentation as applied to overall control of complex machine tools, said such control must take into consideration all possible production variables. Modern machine tool builders, he added, must provide more flexibility along with increased productivity before automation will be universally accepted.

H E Ankeney of Giddings & Lewis and John L Dutcher of General Electric described the operation of a tape-controlled skin-milling machine. Skin mills differ from ordinary planer-type milling machines, they said, in that feed rates are higher, spindles have more horsepower and higher speeds. The object of the machine's record play-back control is to reduce setup time, position feeds between cuts, change templets, and check work in progress. Actual machine time, they said, is only a small percentage of production time.

### Playback Recording

To make a playback recording, the machine is put through the motions necessary to make a desired part while a recording is made. Most non-productive time is not recorded. Thus, when the machine follows the playback record, much non-productive time is eliminated, the speakers said.

Closing sessions on Wednesday October 27 included showing of a film on the Navy's "Project Tinkertoy," with discussion of the film led by E L Behringer of Micromatic Hone Corp, Detroit; a talk by A V Wise and J W Picking of Reliance Electric & Engineering Co on the need for a replaceable package of electronic controls, and for more reliable controls; and a panel sessions on electric clutches for machine tools and their relationship to automation.

**COMMEMORATIVE GAVEL** is given retiring AMTDA President Thomas R Rudel (left) by his successor, Raymond A Vidinghoff (center). Looking on is James C Kelley, new general manager of the Association

# THE MACHINE TOOL MARKET:

## AMTDA Sees Replacement as Its Biggest Potential

**There's plenty of machine tool business around today — and there'll be even more tomorrow — but it's up to the distributor to get out and beat the bushes for it. That was the theme and sentiment of AMTDA's annual meeting in Cincinnati**

CINCINNATI—Replacement is the biggest potential market for machine tools. With new sales weapons now at hand, distributors should drive hard for business in that area.

There is a lot of machine tool business to be had if a good selling job is done. Capital equipment spending in 1955 will be liberal and the orders will go to those who show users how they can sharply reduce their production costs.

Such was the sentiment dominating the 30th annual meeting of the American Machine Tool Distributors' Association at the Sheraton-Gibson Hotel October 19-20. The meeting was the best attended in the association's history, a large number of machine tool builders being present as guests.

U. S. Senator Ralph E Flanders of Vermont, former president of the Jones & Lamson Machine Co, spoke on his early days in the machine tool industry at Brown & Sharpe at the dinner meeting, which was one of the high spots of the two-day gathering.

The meeting also marked the first official appearance of James C Kelley in his new capacity as general manager of the association. Mr Kelley will spend much of his time in the field visiting distributors and users of machine tools.

Mr Kelley's appointment is in line with AMTDA's greatly expanding circle of activities, retiring AMTDA President Thomas R Rudel, Rudel Machinery Co Inc, New York, said in his presidential address.

Mr Rudel also cited increased activity on the part of the Association's Government Relations Committee, and the hiring of the public relations firm of Harold C Meyers & Co to publicize AMTDA and its activities. Executive board meetings of AMTDA have been increased from two to four a year, Mr Rudel said, to provide closer liaison between the Association and its members.

One interesting fact brought out by Mr Rudel in his address was that the Italian and French machine-tool builders, who have long built light, underpowered machine tools, have beefed up their machines to a point where they are comparable to those of the Americans and the Germans in both sturdiness and horsepower.

While these machines are not expected to become a major factor on the American market, Mr Rudel

said he believes they will provide stiff competition to US machines in foreign markets. It is significant, he said, that Canada bought 90% of its machine tools from the US prior to World War II—today only 43%.

### NMTBA President Speaks

Replacement of old equipment is a matter of investing money, not spending it, Herbert L Tigges, president of the National Machine Tool Builders' Association and the executive vice president of Baker Brothers Inc, told the members. The sales approach should be made mainly on the financial side, because thousands of replacement programs have been worked out by operating men and are bottled up today in desks of financial executives.

"When you can add to the depreciation benefits the savings in production costs to be derived from new equipment," he said, "you have a double-edged argument in which to approach the financial executive who has been holding back."

Every machine tool salesman should familiarize himself with the depreciation provisions of the new law and be prepared to walk into a man's office with actual figures in black and white, to be put down alongside the figures on savings in labor costs, Mr Tigges emphasized.

It is far more possible today than a few years ago to get out of the latest machine tools all the productivity which has been built into them, he commented. This is attributable to the weeding out of the poorer workmen as the transition back to more competitive conditions occurred. This situation is leading many companies to restudy standards and incentives. In setting new standards, management is led inevitably to a resurvey of the age and condition of its productive equipment. "These days a man's performance is based far more on the machine than on the man," he said.

The machine tool industry, like other industries, will be in a period of selective prosperity in 1955, Burnham Finney, editor AMERICAN MACHINIST, predicted. Whether the individual machine tool distributor or builder participates in that prosperity will depend in large measure on the kind of job that each one does separately and in cooperation with the other. Mr. Finney posed a series of nine questions that each distributor must ask himself as he prepares for stiff competition.

### Builder-Distributor Liaison

Distributors are the sales department of the machine tool industry, he pointed out. Upon the ability of these distributors to sell depends the success or failure of most companies making machine tools. A deep responsibility rests on builders, on the other hand, to see that their distributors are not asked to sell machine tools of 1945 or 1947 design. The U.S. machine tool building industry, as a matter of record, is in the midst of a period of major redesign of its products to meet the new needs of customers and to take advantage of recent technological progress.

Great gains in machine tool sales can be made in the replacement area, Mr Finney said. An important increase in that area would give a stability to the machine tool industry that it does not have today. In selling replacement, distributors should use the principles of the MAPI formula and not brush them aside because they think them too highbrow or too hard to understand. These principles should be adapted to suit each distributor's needs.

The machine tool salesmen's job is just beginning, now that the depreciation law is more favorable, Tell Berna, general manager of the National Machine Tool Builders' Association, told members. The law is of no value unless machine tool users take advantage of it. "It is up to the salesmen now to get the customers through the door," he commented.

Attempts are being made, and with some success, to bring government procurement as close as possible to industrial practice, Mr Berna declared. Congressmen unfortunately play politics with procurement.

The outlook broadly is encouraging, with the recession flattening out, Mr Berna said. A great opportunity exists in the machine tool industry to sell replacement of old machines. The automobile industry, for example, has been replacing its equipment at a rate of only 1% a year, and industry as a whole at 2%. Machine tool builders now have many new selling weapons, including leasing, more liberal credit terms, quicker depreciation, etc.

### East-West Trade

No great increase in East-West trade in machine tools is likely to occur as a result of the easing of restrictions, Ralph E Cross, assistant administrator of the Business and Defense Services Administration, Department of Commerce, and executive vice president Cross Co, stated. "I don't think the industry

**VICE PRESIDENT**
**Henry R Hanson**
Wm K Stamets Co
Cleveland

**SECOND VICE PRESIDENT**
**Joseph F Owens, Jr**
J F Owens Machinery Co
Syracuse, NY

**SECRETARY-TREASURER**
**Frank Habicht**
Marshall & Huschart Machinery Co
Chicago

## AMTDA continued

has a stomach for this kind of business; and if it did, I don't think that public opinion would tolerate it."

No one argues with the logic of getting government out of business, Mr Cross said, but "disposal of facilities needs watching to see that it does not depress capital goods industries, or interfere with competition." Protection against danger of war or bomb damage is not exclusively that of the government, he pointed out. Management must accept responsibility for protecting its stockholders against losses regardless of the cause.

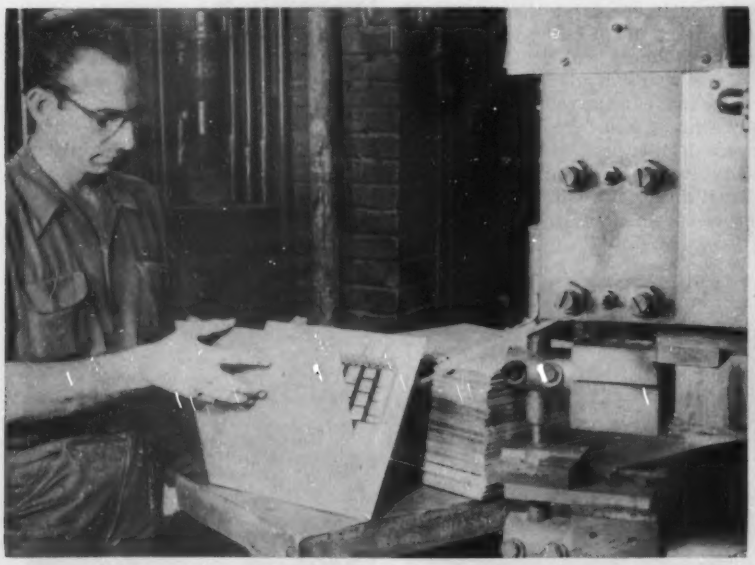
Efforts of capital goods producers to lease their products to industry are being retarded because the government is competing with and underbidding private industry by leasing equipment at less than half the rates charged by industry, Mr Cross commented. This practice should be halted. He revealed that the Metalworking Equipment Division of BDSA has asked the President's Board of Economic Advisors to review the entire subject of what to do with government-owned machine tools, the replacement value of which is in excess of $5 billion. Beyond that, BDSA has requested formation of government policies for managing and using government production facilities and for capital replacement and modernization to eliminate enormous peaks and valleys in the metalworking equipment industry.

Any new equipment acquired after December 31, 1953, can be depreciated on whatever basis the user feels is reasonable, R A Vidinghoff reported for the subcommittee on accelerated amortization. The user should be prepared to back up his figures, but the burden of proof for upsetting the chosen figure is on the Internal Revenue Service, which has indicated that it will take a liberal point of view. Once a pattern is adopted, however, it cannot be changed without written consent of the IRS.

Mr Vidinghoff called attention to the fact that many companies have been depreciating machine tools in much less time than Bulletin F. But the companies doing this have been mostly big companies that have statisticians and lots of records. Even on equipment bought prior to December 31, 1953, you may be able to get a more liberalized deprecia-

# A New Twist to an Old Process: Tubing

NEW YORK — "Any pattern that can be drawn on a sheet of paper can be produced on a finished plate" with a new application of the roll bonding principle developed by Olin Mathieson Chemical Corp. The process makes it possible to create any pattern of tubing, however complex, within a continuous homogenous sheet of metal. In the refrigeration industry, the company claims, the process has cut tooling costs of new evaporator patterns from $50,000 to $50, retooling time from six months to one week. For the aircraft industry, Olin Mathieson claims this process may overcome the weight-to-strength problem by permitting use of the roll bond for both structural members and for heating, fuel storage, and cooling. Here's how the process works: (1) two flat pieces of aluminum are cut to size and cleaned, (2)



**Silk-screened pattern "sandwich" is stop-welded, bonded, pressed . . .**

**ONE SILK-SCREENED AND ONE PLAIN ALUMINUM SHEET** are placed face to face. Sheet on right has been silk-screened with stop-weld to create pattern channels. Pieces are then spot-welded and hot- and cold-rolled to make strong bond

**PATTERN SHEET** (in this case a refrigerator evaporator plate) is placed in hydraulic press between metal platens

tion allowance if you can prove a hardship case, he said.

Teams comprising machine tool men as well as representatives of the Defense Department are to be set up wherever the Defense Department has major warehouse facilities to assist in deciding what should be done with government-owned tools, Henry R Hanson, chairman of the subcommittee on permanent defense capacity, reported. Such teams, including distributors and builders, have surveyed six warehouses the past six months. The first of the new teams has completed a survey at the O'Hare Field Depot in Chicago where it found 2500 machines. All but 274 of them will be retained by the Air Force, the remainder being offered to the other services.

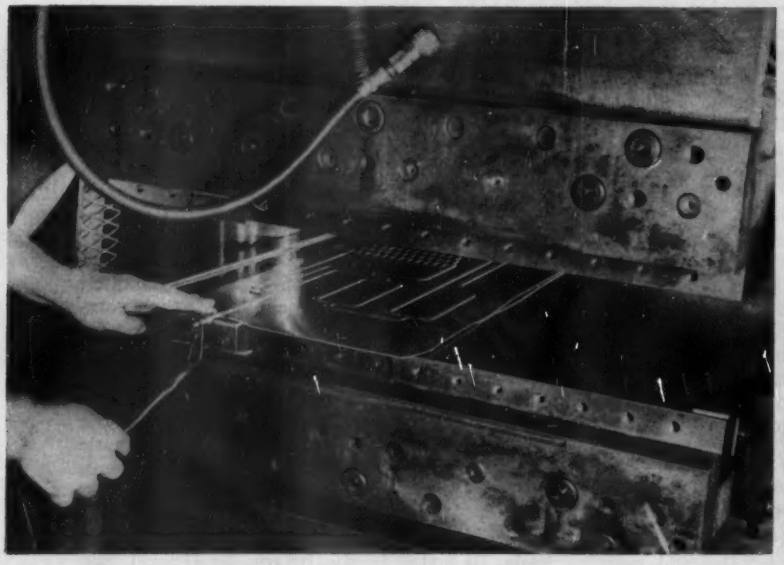
Mr Hanson said that the Metalworking Equipment Division of BDSA, by agreement with the Defense Department, will screen all surplus machines scheduled for disposal and recommend whether to keep them for defense, for supporting and essential civilian needs or to sell them. As a beginning, BDSA has recommended retention in the National Industrial Equipment Reserve of 60 units from the O'Hare warehouse.

The attempt to write federal specifications for machine tools has been tedious and slow and has about come to an end, Edgar J Seifreat, chairman of the government relations committee, reported for the subcommittee on procurement policy. At least one government agency has refused to continue the work because it realizes how impractical it is.

The committee on rental plans has reviewed 21 different leasing programs for machine tools and can find no common pattern among them, Frederick B Scott, chairman, reported. These programs vary widely in general terms and in interest rates. The company that leases equipment, he said, should do so with its eyes open regarding possible trouble with the Internal Revenue Department, which has ruled that no rental program can be called fair if the rental in the first three years exceeds the cost of the machine. Mr Scott advocated formation of separate leasing companies as a third party to deal with leases of machine tools. Such companies already are operating.

# Patterns from a Single Sheet of Metal

desired tubing pattern is applied to one sheet by the silk-screen process, using a stop-weld material as "paint," (3) the sheets are placed face to face and spot-welded to keep them aligned, then heated and rolled to bond them together and reduce the sheet to the correct thickness, during which pattern is elongated 4.16 times, then (4) sheet is annealed, welding or bonding all areas not stop-welded, (5) one end is trimmed, baring lead-in end, (6) inflating needle is placed in lead-in end, (7) pattern is pressed between metal platens, (8) air is forced through needle into the stop-welded channels, inflating them, (9) channels are flushed and cleaned of stop-weld, and (10) channels are dried internally. The result of Olin Mathieson's process: inflated passage-ways on the metal pattern corresponding exactly to the blueprint.



## and inflated to form tubing patterns corresponding exactly to drawing

**INFLATING NEEDLE IS APPLIED TO END OF STOP-WELDED AREA** and air pressure is applied, ballooning out the pattern. By the time it reaches this stage, pattern has been stretched to 4.16 times the length of original drawing used in making the silk-screen pattern

**MORE THAN 250,000 PATTERN PLATES** have been made in Olin Mathieson's pilot plant in the last 18 months

# TODAY'S MACHINE TOOLS: What Does

**General Electric, one of the world's largest users of machine tools, put its new Manufacturing Research Department to work finding out just what users want in machine tools. Here are the answers, as reported by GE's machinability consultant, Dr W W Gilbert, at AMTDA's recent meeting in Cincinnati**

CINCINNATI — "You can't do today's work with yesterday's tools and be in business tomorrow." That's the warning given by Dr W W Gilbert, General Electric Co's machinability consultant, who reported on his company's machine tool needs, likes, and dislikes, at the annual meeting of the American Machine Tool Distributors' Association in Cincinnati, Oct 19-20.

Backing his contentions with the combined opinions of the heads of General Electric's manufacturing departments, Dr Gilbert said that today's machine tool users have some pretty definite opinions of what they expect and want in machine tools —and they think the machine tool manufacturer, distributor and salesman should help them get what they want.

As modern industry enters the era of automation, metalworking men feel they're entitled to direct-from-the-factory technical assistance in planning coordinated production lines and tooling.

### Tool Engineer/Salesmen?

Dr Gilbert said that his conversations with G-E operating men brought out a demand for machine tool salesmen with basic engineering knowledge of their machines and the ability to help in adapting those machines to the specific needs of the customer.

As these machines become more complex, particularly as to electrical and hydraulic circuits, the user is faced with two alternatives—either he must train his own men to service and maintain them, or he can rely on the service of the machine tool manufacturer. And if these machines become even more complicated, it may come to the point where users will rent machines from the builder, who will furnish trained men to maintain them.

One fault of modern machine tools, susceptibility to external vibration, has been overcome at G-E by an idea borrowed from the automobile. In one production line, it was necessary to put precision grinders in the bay next to the punch presses. G-E offset vibration by installing heavy bases under the critical machines, and supporting the bases on vibration absorbers, similar to auto shock absorbers. Now, according to Dr Gilbert, every machine in that particular shop is vibration mounted and accuracy has improved. The machines can even be moved to a new location without the need for building a new heavy foundation because the vibration bases can be moved easily. G-E has a request to make of the machine-tool industry in this connection—that leveling screws be placed so that these machines could be made to standard sizes.

Machine tool makers could also take a tip from the automakers, Dr Gilbert said. Today's machine tools for lighter work are generally powerful enough to take advantage of carbide tools at ordinary speeds, but they could use more reserve power for heavy work. He cited the 185 hp of today's cars as a parallel—they will climb hills at 60 mph, where a few years ago autos labored up at 35 mph—and this reserve-power principle could be applied to machine tools. Even in the field of tool controls, Dr Gilbert added, machine tool people might try to develop the principle of the automatic transmission, which automatically adjusts itself to every load or speed.

### "Luxury" Machine Tools?

Continuing in his parallel between automobiles and machine tools, Dr Gilbert said that noise could be dampened with a sound-absorbing blanket and padding, and that machine tools, like automobiles, should have lighted instrument panels located directly in front of the operator. Even the luxury accessories that attract car buyers—comfortable upholstering, windshield wipers, pushbuttons for remote controls—could be applied to machine tools, he added.

Speaking of General Electric's machine tool outlook, Dr Gilbert said this is affected by the company's decentralization policy, wherein each division has the authority and responsibility to progress in its own fields of production. This makes it necessary for close cooperation between the machine tool builder and the operating departments of the company. In effect, the machine-tool salesman has become a key man at General Electric.

### Design — The Long View

Modern machine tools must be designed with the long view in mind—the US skilled labor pool will increase only 11% in the next 10 years but production will double. Thus industry must meet demand not merely by increasing the size of its facilities, but by using new methods to obtain higher efficiency in all phases of manufacturing. One method of doing this is to employ automation.

### The How of the Automation

Automation, Dr Gilbert said, "is becoming a way of manufacturing, built upon the foundation of progressive step-by-step upgrading of our manufacturing operations." Automation, he said, comes into being this way: first there is the manual area of manufacturing where everything is made by hand; then hand tools and simple materials handling equipment are employed; then power-driven machines and simple conveyors are brought in; electrical controls and automatic operation of the individual machine are introduced; then automation—fully automatic machines combined into automatic units, then into automatic systems, automatic sections, and ultimately, the automatic factory.

Although the automatic factory is still in the future, Dr Gilbert said that progressive upgrading of manufacturing, inspecting, assembling and testing operations are a definite step on the way.

Materials handling must be integrated with machine tools when

# Industry Expect of Them?

the era of automation is reached, and this can be done in three ways, Dr Gilbert said. First, by adding transfer equipment to standard machines. Second, by equipping standard machines with transfer mechanisms specially designed for them, and third, by using standard components on special machines—a class of equipment generally reserved for applications involving several operations. In GE's Medium Induction Motor Dept, where all three types of equipment are used, every machine is mounted on vibration mounts.

Industry must also concentrate on reducing manufacturing costs when using individual machines in job shop areas, Dr Gilbert said. This involves cutting (1) actual machine costs, (2) tool changing costs, (3) non-productive costs.

### Cutting Machining Costs

The actual machine cutting costs can be reduced, Dr Gilbert said, by taking full advantage of metal cutting principles and good planning. Rates of metal cutting can be increased many times by increasing feeds, using multiple tools of the best design, and machining free-cutting materials. Most modern machines, he said, have enough power for average commercial conditions, but they aren't rigid enough to take heavy cuts at high speeds without vibration. Reducing vibration will allow more effective use of the harder grades of carbide, he added.

Tool changing time can be reduced by using prelocated tools and quick-changing tool holders. This also makes it possible to operate at higher cutting speeds and change the tools more often. Prelocation of tools becomes even more important with high-production transfer machines, where tool failure could shut down the entire machine. Insert tools, such as the square, triangular or round carbide insert, allow rapid tool changing combined with prelocation. The changing of tools is a major problem that deserves much more study and attention, Dr Gilbert said. It is not practical to develop automated equipment if it is necessary to have a man on hand constantly to change tools, he said.

By way of reducing non-productive time, Dr Gilbert suggested that designs be incorporated into standard machine tools to make cutting tools available. Turret lathe manufacturers, he said, have employed turrets on both the cross slide and the tail turret to hold the tools accurately and rigidly in position so that they are available during an operational sequence. But, he said, rapid indexing of the turrets by power is needed on some of the larger machine tools to reduce operator fatigue. Standardized spindle mountings, he added, should be used wherever possible so that interchangeable arbors, chucks and tool holders can be used on a variety of such machines.

### Loading Problems

The loading of material into the machine tool becomes more of a problem as the size of the parts increases, and as manufacturing operations are upgraded. It is desirable, Dr Gilbert said, for the machine tool manufacturer to supply as standard items workholding devices of sufficient rigidity to take full advantage of the machine tool's capabilities. Lifting and positioning devices, he added, could be incorporated even into low-production equipment.

It would further be desirable, he said, for every machine tool to have lights to illuminate the working area, storage cabinets and worktables where drawings are read. Dr Gilbert also urged widespread adoption of the NMTBA and JIC codes to eliminate difficulties in servicing hydraulic and electrical controls.

### What GE Wants in Tools

Here are some of the equipment and tooling needs brought out in a survey of GE's manufacturing departments:

- The vibration problem must be overcome in machine tools.
- Large milling machines, for example, should be furnished by the builder with all necessary workholders and cutting tools.
- Small high-precision machine tools, approaching the jeweler's lathe in size and capable of working to extremely close tolerances, must be developed for the manufacture of small aircraft components.
- Chipless production methods are becoming more and more necessary in fields where high-cost materials are used, and machine tools must be developed to carry out these methods. Some chipless roll-forming lathes have already been developed to form parts of varying cross sections without producing chips. And precision forging of thin sections of high temperature alloys can form turbine blade materials in instances where lathes are uneconomically slow. Shell molding, too, eliminates many machining operations and cuts loss of material.
- Better methods are needed for forming thin sheet metal for aircraft. Machines should be developed to stamp and draw the metals and transport them from one operation to the next.
- Heavy sub-bases must be added to standard machines if vibration mountings are to be used and alignment maintained. The machine tool frames should be designed to fasten to these floating bases and still allow for leveling.
- Chip disposal systems should be designed so that automatic conveyors will transport the chips away from the machine.

## BARBER-COLMAN BUYS HENDEY MACHINE CO

ROCKFORD, ILL—The machine tool business of the Hendey Machine Co, Torrington, Conn, has been sold to the Barber-Colman Co of this city, which will expand its plant here to make the Hendey line of lathes and shapers.

Hendey Machine Co will henceforth be known as the Hendey Machine Division of Barber-Colman Co and will manufacture the complete line of Hendey toolroom and manufacturing lathes and shapers at Barber-Colman's Rockford plant, where operations will begin within two or three months. Hendey's Torrington buildings have been sold to the American Brass Co, and its machinery and other equipment have been sold at auction. Parts, sales and service for Hendey products will be available temporarily either through present Hendey sales representatives or through Barber-Colman's sales organization, which also handles B-C's line of gear cutting machines, hobbers and textile machinery.

# AGMA Announces New Gear Standards

**New standards and techniques for gearmaking highlighted one of the most technologically productive sessions in AGMA history—its four day semi-annual meeting in Chicago**

CHICAGO, Ill—Some 330 people attended the 1954 semi-annual meet- of the American Gear Mfrs Assn at the Edgewater Beach Hotel here Oct 24-27. Scheduled as a technical meeting, it was unusually productive, both of new and revised standards and of technical papers. From the opening reception Sunday night through the final session Wednesday noon, technical affairs dominated the meeting.

Three technical papers were presented, "The Unitool Method" (for cutting spiral-bevel, Zerol, bevel, and hypoid gears) on Monday morning, by M L Baxter Jr, chief research engineer of The Gleason Works, Rochester; "Increased Gear Shaper Production through Chip Flow Control," by J F Jones Jr, factory engineer, The Fellows Gear Shaper Co, Springfield, Vt; and "A Precise Technique for Accurate Checking of Gear Dimensions," by W S Tandler, pres, The Warner & Swasey Research Corp, New York City. Each paper developed an unusually extensive discussion. An extract of Mr Jones' paper will appear in a later issue of *American Machinist*.

### New Standards

New standards 270.01 on gearmotor output, and 154.01 on gearmotor ratings were approved as full standards, while 462.01 on overhung loads on gearmotors was approved as a tentative standard. Spiral bevel-gear speed-reducer standard 430.02 is to be revised to increase ratings a third. Standard 411.0 on aircraft spur gears is under development, and two further standards on aircraft bevel gears and automotive bevel gears are being worked on.

Ready for approval are 123.01 on multi-tooth gear-cutting tools and 201.01 on single-tooth tools, as well as 411.01 on design processes for aircraft spur gears. Systems for spiral and straight bevel gears (nos 209.01 and 208.01) are ready for membership approval, and 222.01 on strength of straight and spiral bevel gears is nearing completion. The Inspection Committee completed three standards on tolerances, for spur and helical, bevel and hypoid, and worms and wormgears, as well as a standard on pin-measurement (revised), and is now undertaking major revision of the master-gear standard.

Keyway standard 261.01 is being brought up to date, as well as standards on hobbing tooth forms, on rating strength of spur-gear teeth, and on a general formula for rating scoring resistance. Tentative standards 121.02 and 122.02 on single- and multi-thread hobs are being offered as standards, and a standard for selection, inspection and use of hobs is being developed. Other standards ready for approval include 110.02 on nomenclature for gear tooth wear and failure, 111.02 on letter symbols for gear engineering 112.02 on nomenclature, and 113.01 on gear drawings.

The meeting was the largest fall meeting thus far and one of the busiest.

## French Automakers Visit David Brown

**BRITISH MACHINE-TOOL BUILDER DAVID BROWN** invited technicians from five of France's top automobile manufacturing firms to see the new Brown Hydrax production hobber in action at Manchester. The visitors, representing Renault, Simca, Peugeot, Berliet and Panhard, also toured Brown's Huddersfield Gear Works and Tool Company

## $182-MILLION EXPANSION FOR BRITISH FORD

LONDON—Hard on the heels of General Motors Corp's announcement of plans to spend $182 million in bolstering its British and European output comes the revelation that the British Ford Motor Co alone will spend an equivalent amount on expansion and modernization.

Ford will spend the money in expanding its powerhouse, coke ovens and facilities at Dagenham—will build a new press shop and foundry and greatly increase metalworking and assembly operations there.

"Satellite" plants will built around Dagenham—a parts depot at Aveley, Essex; a machine shop at Basildown Newtown, and facilities at Woolwich Arsenal.

British Ford's expansion program will increase floor space by about 4-million sq ft, and will greatly step up production from current levels of 1300 cars, trucks and tractors—insufficient to meet current demand.

Griffith C Taaffe

Rudolph W Glasner

William A Martin

# Names in the News . . .

**Griffith C Taaffe** has been elected president of Cincinnati Lathe & Tool Co. He joined the firm as sales manager in 1947, and was made vice president in 1949.

**Roy Abernethy** has been appointed vice president of Nash Motors Div sales. He succeeds **H C Doss,** who is resigning to become a consultant to Nash's parent corporation, American Motors. Mr Abernethy resigned as vice president and general manager of the Kaiser-Willys Sales Div, Inc, in order to join Nash.

**William D Turnbull** has been appointed vice president, sales, of Kennametal Inc, Latrobe, Pa; he moves up from his post as general sales manager. Before joining the company Mr Turnbull was vice president in charge of sales for the Pomona Pump Co, of Pomona, Calif, and prior to that, sales manager of Westinghouse Electric Corp's Agency & Specialties Div.

**Rudolph W Glasner** has been elected a director and vice president of Pressed Steel Car Co. Mr Glasner is president of the Clearing Machine Corp, of Chicago, which was acquired last month by Pressed Steel; he will continue to manage the operations of Clearing Machine as a division of the parent company.

**Charles A Woodley** has been elected a vice president of Caterpillar Tractor Co, and **Lloyd J Ely** has been appointed manager of the company's Peoria plant. Mr Woodley has served as general factory manager, and as manager of the Peoria plant since June 1953. Mr Ely, a member of the firm since 1916, has been manager of manufacturing at Peoria for the past year. **Gordon Swardenski,** formerly assistant manager of manufacturing, succeeds Mr Ely; **Cary L Ice** takes over Mr Swardenski's post; and **Robert E Gilmore** has been named manager of the engine factory.

**William A Martin** has been appointed works manager of Chrysler Corp's Marine & Industrial Div. Mr Martin, who joined the organization in 1942, was general production superintendent of the Newark, Delaware, tank plant, and for the past year has been serving as production manager.

**Clifton T Foss** has been appointed assistant general manager of American Bosch Arma Corp's Arma Div. Mr Foss, who has been associated with Arma for 21 years, will continue to serve as vice president, engineering, of the division.

**Reuel E Warriner** has been appointed vice president, sales, of Climax Molybdenum Co. Mr Warriner, associated with International Nickel Co for 19 years, has been in charge of the steel section of the nickel sales department since 1943.

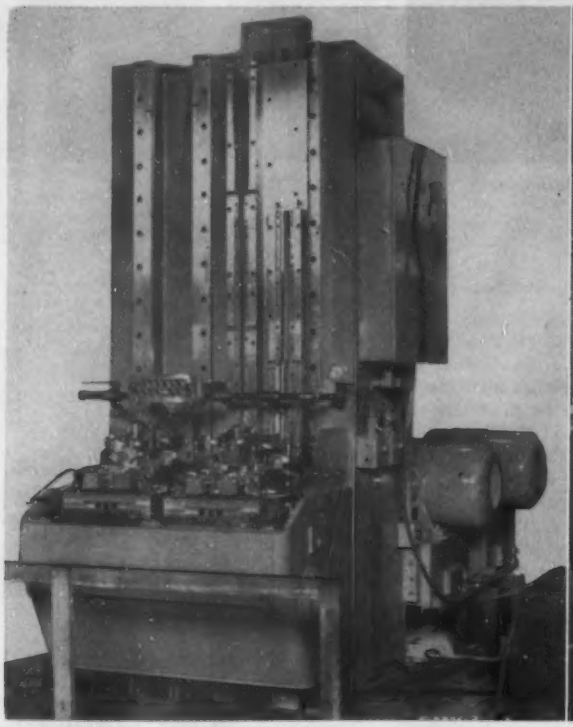
**Harry H Rose** has been elected vice president and director of the Simmons Fastener Corp of Albany, NY. Mr Rose will continue as general manager, a post he has held since 1949, when he was promoted from general sales manager.

William D Turnbull

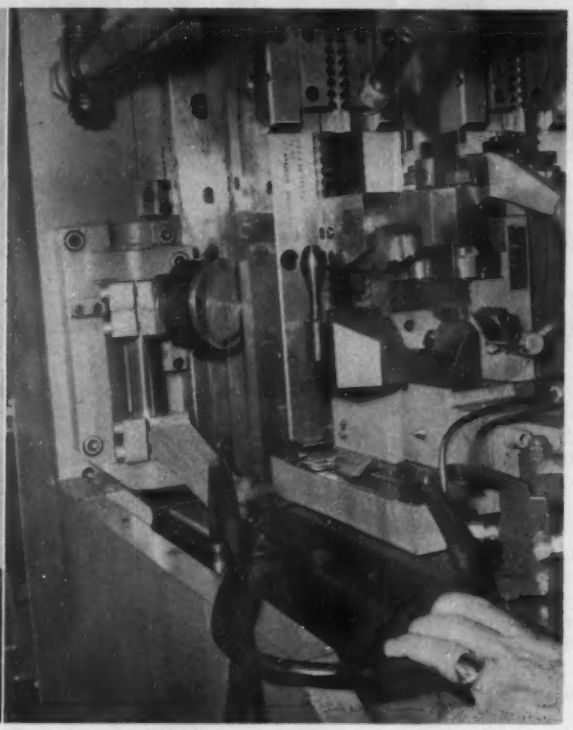
Charles A Woodley

Lloyd J Ely

# New Shop Equipment,

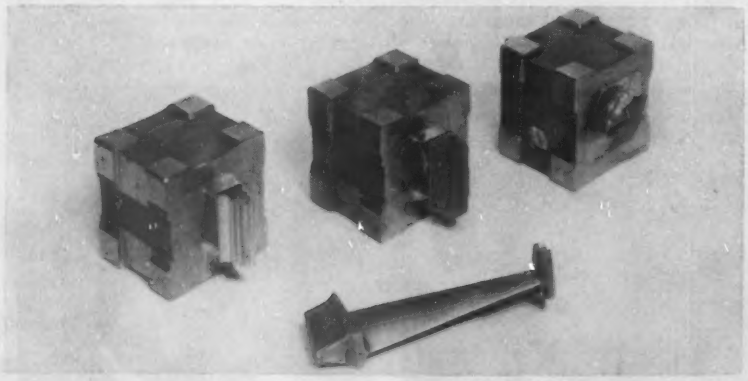


**JET ENGINE TURBINE BUCKETS** are broached on this 15-ton, 100-in.-stroke, dual ram, vertical surface broaching machine—recently demonstrated as one of new machines in Detroit line. Carbide-tipped broaches produce fir-tree form at bucket root, and also finish tip end. Tool life is 800 to 1000 parts between grinds



**RAM IS PRELOADED BY** pressure roll through torsion bar actuated when broach is up; load is removed on return. A 1200-lb thrust is imposed sideways; 800-lb force keeps ram back—providing rigidity for broaching work-hardened material. Production rate is 500 per hour with speed of 60 sfpm and sulfur-base oil coolant

## New Detroit Line of Broaching Machines

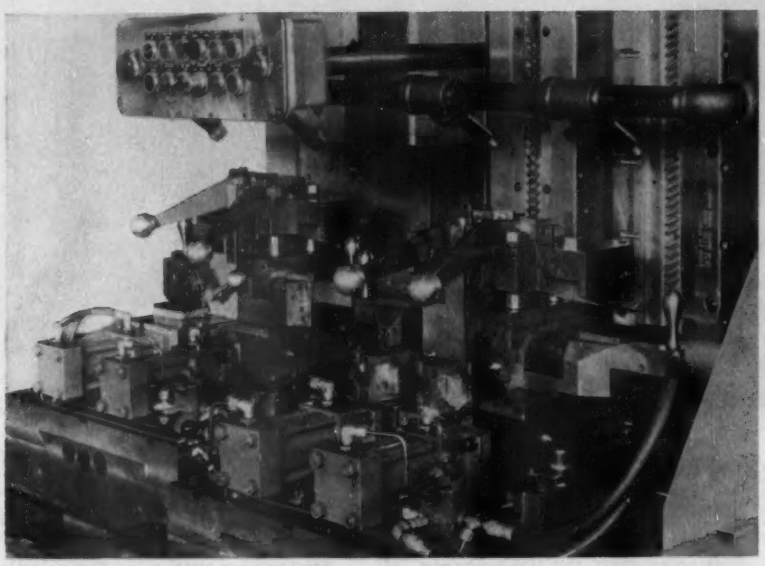


**CAST STELLITE BUCKETS** are held in square, matrix-filled fixture blocks to maintain squareness and axial alignment of root relative to blade axis within 0.001 in. in TIR. Centrality is actually held in closer as a result of the preloaded slides which run through entire stroke within 0.0005 in. Then, in broaching the bucket . . .

The dual-ram vertical surface broaching machine illustrated is one of the line recently demonstrated at the new Rochester, Michigan, plant of Detroit Broach Co. It incorporates a separately powered knee which positively locks the shuttle table in position and—to stabilize the machine and reduce chatter—the piston rods are in tension during the broaching stroke. An adjustable dovetail table permits changing depth of cut without moving work or tools. Movable wedges at the finishing broaches take up differences caused by reground teeth.

Knee, column, and base are ribbed, with the result that overload capacity is as high as 150%. Normal capacity is 30,800 lb. Cutting speed is

# Materials and Parts . . .



**BLOCK IS LOCATED** in hydraulically operated work fixture. At first station sides of root end are notched to eliminate deflection in second station by equalizing stock removal. Fir-tree is then produced, after which block is transferred to second fixture for broaching tip ends. Broaching parts reduces plunge-form grinding time

variable from 8 to 120 sfm; stroke from 12 to 100 in. Tables are 20x22 in. Machine is equipped with two DX-6011 Oilgear pumps and 270-gal. oil reservoir. Power is supplied by two 50-hp motors; 5-hp motor operates shuttle table.

Other machines in the new line include vertical, single-ram surface broaching machines, vertical down-pull internal broaching machines, and horizontal internal broaching machines.

All vertical machines will be furnished in 5, 10, 15 and 25-ton capacities, each available with stroke lengths of 42, 54, 66, or 90 in. A 35-ton vertical machine is available in 54, 66, and 90-in. stroke models.

Horizontal internal machines are available in 3-ton, 36-in. and 48-in. stroke models, 6-ton capacities with the same stroke range, a 10-ton model of 54-in. stroke, 15-ton with 64-in. stroke, 25-ton in 64-in. and 72-in. stroke models, and 35-ton and 50-ton machines both with 72-in. strokes.

The 15-ton, 54-in. stroke, vertical, down-pull machine has a normal capacity of 30,800 lbs. Cutting speed is variable from 4 to 31 sfm and the variable return speed is up to 80 fpm. Stroke is adjustable from 6 to 57 in. One DX-3511 Oilgear pump is employed with a 65-gal oil reservoir and a 25-hp motor powers the machine. A 3-hp motor handles the slide mechanism.

Five-ton, 54-in.-stroke dual-ram vertical machines have a normal capacity of 11,500 lbs. Cutting speed is variable from 4 to 35 sfm and the stroke is adjustable from 6 to 54 in. Tables are 16 in. front to back and 18 in. left to right. Main slide is 12-in. wide. A DX-1211 Oilgear pump and an oil reservoir of 46 gal are employed. Power is obtained from a 10-hp motor and 5-hp motor operates shuttle table.

All machines are equipped with Oilgear hydraulic equipment, covered by Oilgear patents, and are provided with means for selective manual inching and semi and fully automatic cycles. All hydraulic and electrical equipment is designed to meet JIC standards.

*Detroit Broach Co, Rochester, Mich*

## . . . including


**Universal gear hobber** machines both spur and helical gears at selective variable speeds ranging to 570 rpm page 186

**Cylindrical grinders,** plain hydraulic, finish parts requiring use of large-diameter, wide wheels . . . . . page 187

**Lathes** with 21½- or 26-in. capacity are low-cost units with 12 all-geared spindle speeds from 24 to 960 rpm . . page 188

**Production drilling** of holes with dia from 0.004 to 0.125 in. is accomplished by automatic pneumatic - hydraulic unit . . . . . page 190

**Scarf and edge milling** machine has 3x12-ft table; horizontal spindle tilts 30° up or down page 194

**Die-casting machine** has auto clamp, self-contained package power unit . . . . . page 198

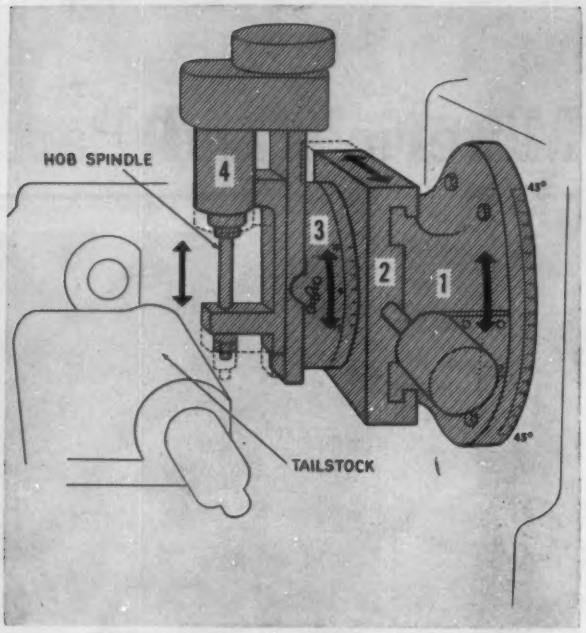
**Drilling and tapping machines,** pushbutton operated, are built to JIC standards . . . . page 206

**Cable conveyor systems** handle parts through dipping operations . . . . . page 210


### . . . *and in Nov 22*

**Horizontal cutoff** machine designed by well-known manufacturer of vertical machines.

**Lathe attachment** provides templet - controlled tracing slide for multi-cycle single-point turning of irregular shapes.




# Universal Gear Hobber Allows High Speed

Model 1445 Ultra-Speed hobber is the second member of the family, but not a "carbon copy" of its predecessor. It has several advanced engineering changes, besides retaining the high-production characteristics of the 1458, such as, "plunge" cutter feed and automatic workholding tailstock.

A single-spindle hobber, the 1445 will machine both spur and helical gears at selective variable speeds ranging to 570 rpm. It will handle up to 8-pitch gears having diameters as large as 5 in. and face widths to 4 in. Either climb or conventional hobbing can be utilized.

Design goals of Michigan Tool included:

(1) Planning and constructing every component of the machine for hobbing speeds that are the highest yet known for machines in the same size range.

(2) A new universal spindle head design that incorporates all required feeds and adjustments for hobbing both spur and helical gears.

(3) Easier and faster workpiece handling tailored to the needs of the present automation trend.

Not only is the 1445 capable of handling the highest speeds dictated by present-day hob design and materials, but its designers have anticipated progress in hob development. For this reason, it is engineered to handle hob speeds of the future, when carbide or similarly performing metals become practical hob materials.

Highlighting the universality of the machine is the hobbing spindle head. Three separate adjustments have been incorporated into this section (see drawing)—(1) hob thread angle, (3) gear helix angle, and (4) hob position shift. Hob angles of ± 15° and left or right helix angles to 45° can be set up within seconds. These adjustments are accomplished by means of swivel-mounted sections with vernier scales for supplying accurate settings. Hob position is shifted hydraulically over a total movement of 3 inches.

Another innovation in the spindle head design is the hydraulic-powered crossfeed that drives hob across work at desired helix angle (Label 2). This is in contrast to conventional hobbing where the workpiece is fed across the hobbing tool. It is this feature that avoids change gears and time-consuming calculations, thereby simplifying the machining setup from gear-to-gear.

*Michigan Tool Co, 7171 E McNichols Rd, Detroit, Mich*

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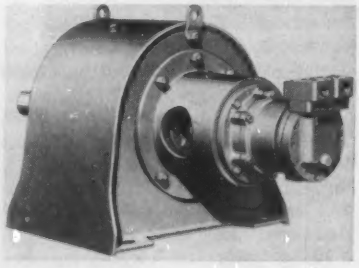


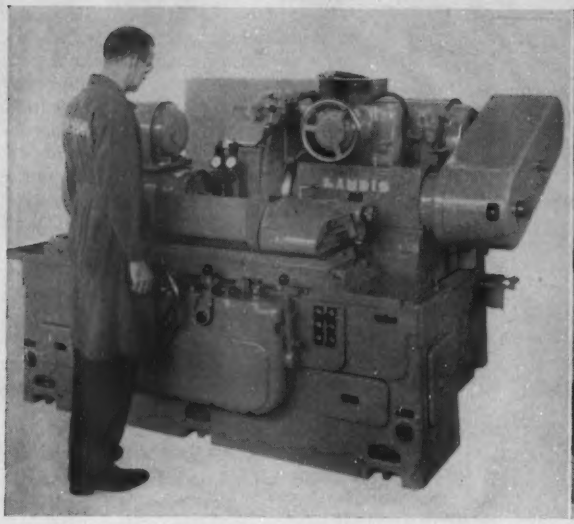
## Oilgearducer

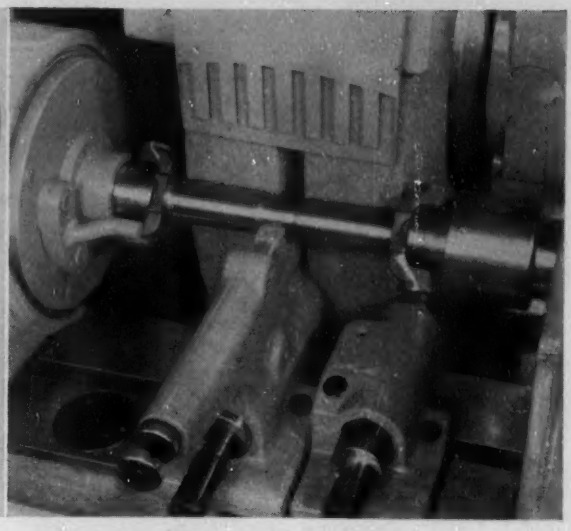
Oilgear hydraulic motors are now constructed with integral Falk reducers. Oilgear motors in sizes of 1, 3, 8, 12, and 20 hp are flanged in resilient coupling connected to Falk single, double, triple, and quadruple reducers with ratio combinations providing maximum output speeds from 1.7 to 1170 rpm. Normally continuous operation output torques ranging from 42 to 41,500 lb-in. are based on a pressure of 1100 psi. Starting and peak torques for intermittent service can be up to 60% higher.

Similar concentric Oilgearducers with improved oil-tight shaft seals for vertical wall mounting and with roundface flanges for floor mounting are also available. Oilgearducers with single or double right-angle output shafts are available in ratios from 5:1 to 1500:1.

When used in combination with Oilgear variable delivery pumps units are reported to provide accurate speed regulation of entire range and infinite stepless speed range, cushioned and controlled acceleration, and other functions.

*The Oilgear Co, 1551 B, West Pierce St, Milwaukee 4, Wis*





# Landis Grinders Use Large, Wide Wheels

Series of plain hydraulic precision cylindrical grinders was designed to finish parts requiring the use of wide or large diameter wheels. Wheels up to 10 in. wide for infeed grinding operations can be used, also spaced wheels for multiple diameter or profile grinding up to 10 in. from outside to outside of wheels. Some pieces requiring large diameter wheels for clearance of webs can be handled on this machine, using 36-in. diameter wheels.

The series is made in both 10- and 14-in. swings. The 10-in. machine is designated DCH and is made in 18, 36, 48, 72, 96 and 120-in. lengths between centers. The 14-in.-swing machine is designated as LDCH and is made in same lengths.

Heavy duty grinding wheelhead and large grinding wheel spindle are used to support the heavy wheels and increased grinding load. By moving a single lever, hydraulic wheelfeed rapidly moves the grinding wheel into position. A slow feed moves the wheelhead, during grinding, to predetermined stop position. After sparkout, wheelhead retracts rapidly to back position. Hand feed with both coarse and fine adjustments in standard. The grinding wheel is driven by 25-hp motor.

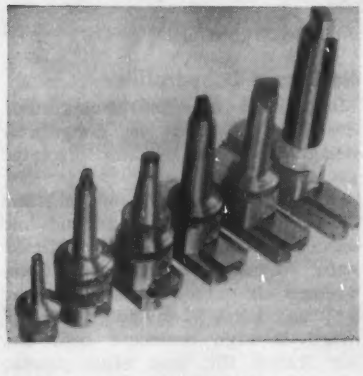
The workhead is powered by a 1½-hp motor. Spindles in the workhead and footstock are extra heavy. The work table may be moved by either two-speed hand traverse or hydraulic power. Speed of hydraulic traverse is variable by dial control. Adjustable tarry is also provided.

Microsphere bearings, of one piece steel construction with babbitt lining support the wheel spindle. The spherical outer shape permits alignment to spindle and adjustment for running clearance. Wheel spindle lubrication is automatic. Filtered oil is pumped from separate reservoir to bearings submerged in oil supplied by pump. An interlock prevents spindle rotation until pressure is built-up in system.

V- and flat ways for wheelhead and carriage are pressure lubricated by filtered oil. Interlock prevents operation of machine unless pressure is maintained. The bed contains reservoirs for hydraulic oil, lubricating oil and coolant. Cast pockets are provided for levelling screws.

The 10x18-in. DCH is shown grinding two diameters of propeller-shaft sleeve yokes. Stock removal is 0.020 in. and production is 190 pph. Work setup on right shows work rest and table-type wheel dresser.

*Landis Tool Co, Waynesboro, Pa*



## Boring and Facing Toolhead

The Chandler-Duplex makes possible boring, facing, turning, grooving and undercutting—all in one setup. It provides power feed for facing, longer slide travel, extremely fine adjustment, T-slot positioning of cutting bar, universal range, and adaptability. There is a model for every size machine.

The power feed movement of the tool slide while the toolhead is in rotation is accomplished by holding knurled feed ring stationary while the toolhead revolves. Thus the cutting tool is fed steadily and uniformly across the work surface for facing cuts and grooving.

An adjustable stop is provided to limit side travel and can be set at any predetermined point. This controls depth of cut when grooving and when facing or undercutting to a shoulder.

*Chandler Tool Company, Muncie, Ind*

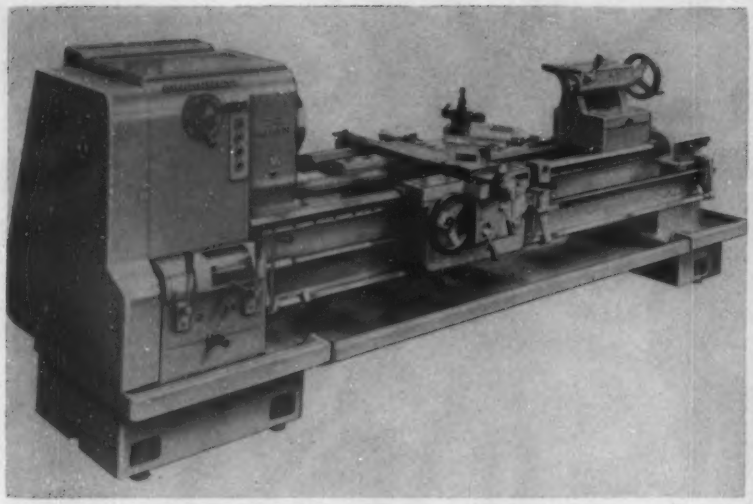
## Portable Hydro-Steam Cleaner

Vapor - Clarkson hydro - steam cleaner 4989-G jets 1200 gal of hot water an hour at 240-lb pressure. Automatic 40-hp generator develops 120-lb working pressure in two minutes and over 1100 pounds of steam per hour which is directed through a Sellers injector where steam heats the water and pressure is increased by a venturi.

Unit is equipped for cleaning in three ways: by jetting out 180 F water under 240-lb pressure, by jetting hot water under pressure mixed with a cleaning detergent, and steam cleaning with or without detergents.

Units is mounted on a trailer.

*Vapor Heating Corp, 6420 Howard St, Chicago 31, Ill*



## Larger Model Tray-Top Lathes Introduced by Cincinnati

All-geared-head, Tray-Top lathes swinging 21½ and 26 in. join the line first introduced in 1947 to provide the industry with modern, low-cost, light- and medium-duty equipment of greater capacity.

The lathes have 12 spindle speeds in geometric progression, with a 3-lever, color-match, direct-reading shift mechanism. The spindle, with long taper key drive nose, is rigidly mounted in three precision antifriction bearings. An extra-large spindle hole is available on demand. All headstock bearings are pressure lubricated with filtered oil. 54 thread and feed changes are made available through a totally enclosed, automatically lubricated quick change gear box, where a lever to reverse the leadscrew is also incorporated.

The apron is a one-piece, double-walled casting with automatic lubrication. Longitudinal and cross feeds are engaged with drop levers operating positive jaw clutches, and a spindle start-stop control lever is supplied at the apron and quick change box. The bedways are ground, and will be flame-hardened on demand. Lubrication of the carriage ways and cross-slide is provided by an oil shot plunger on the apron.

A fully enclosed electrical panel provides a safe and accessible place for the power connections. A built-in disconnect switch guards against exposing a live panel. Power is transformed from 220 volts and over to provide only 110 v at the operator's pushbuttons, a safety feature. The lathes are offered with a 5 or 7½-hp motor mounted on the rear of the headstock for easy maintenance.

Also available is the Tray-Topette, low-cost 12½-in. model, ideal for schools, training use, and to meet the needs of certain shops.

*Cincinnati Lathe & Tool Co, Cincinnati 9, Ohio*

### Motor Control Apparatus

Zero-plugging control systems for instantaneous stopping of electric-motor-driven equipment are a wholly electrical means of developing braking, and are applicable to any reversible motor. System can be used to replace or augment an electromechanical brake on a production machine.

Completely interlocked systems do not require the addition of relay elements to tie them into motor's starter. Switch design eliminates spurious response to vibration, and gives a full range of speeds from zero to the motor's full-load speed. Tachometer element can be attached to the motor, or to any of the machine's driven elements.

System is not only applicable to maintained-run, and/or jogged motors in single-directional or bi-directional duty; in the case of jogged motors it reportedly will not lose control on a short jogging action.

*Techniflex Corp, Port Jervis, NY*

### Deep-Drawing Aluminum Stock Produces Superior Qualities

Aluminum machine stock developed by Harvey is said to have superior physical characteristics because of the method by which it is worked.

Deep drawing the material under extremely high pressure works the rod and bar in such a manner that a completely new metallurgical structure of the metal is obtained. Resulting change in macrostructure reportedly is responsible for unusual machinability. Structure of the metal has a high degree of uniformity, including grain composition and size, bar sizes, and hardness.

Deep drawing, in addition to providing an excellent machining structure, sizes the section to very close tolerances. Each section is thoroughly stretcher-straightened to relieve internal stresses set up during heat-treating and quenching operations.

*Harvey Aluminum, Torrance, Calif*

### Package Power Units

Range of hydraulic power units in standard, JIC, and custom-built designs is available for operating pressures from 250 to 2000 psi.

Self-contained package units include all necessary motors, pumps, controls, valves, piping oil reservoir; also hydraulic accessories such as oil level gages, filters, cleaners, and fittings.

*Turchan Follower Machine Co, 8259 Livernois, Detroit 4*

### Automatic Brazing Furnace

Automatic pusher model furnace specially designed for bright brazing stainless steel at temperatures up to 2150 F has been developed by Harper Electric.

Unit is adaptable for continuous brazing stainless with copper or stainless brazing compound; reportedly maintains dry hydrogen atmosphere combined with uniform heat distribution. Sequence of operations is automatically timed and synchronized for continuous production with one-man operation. It is engineered for integration in production lines.

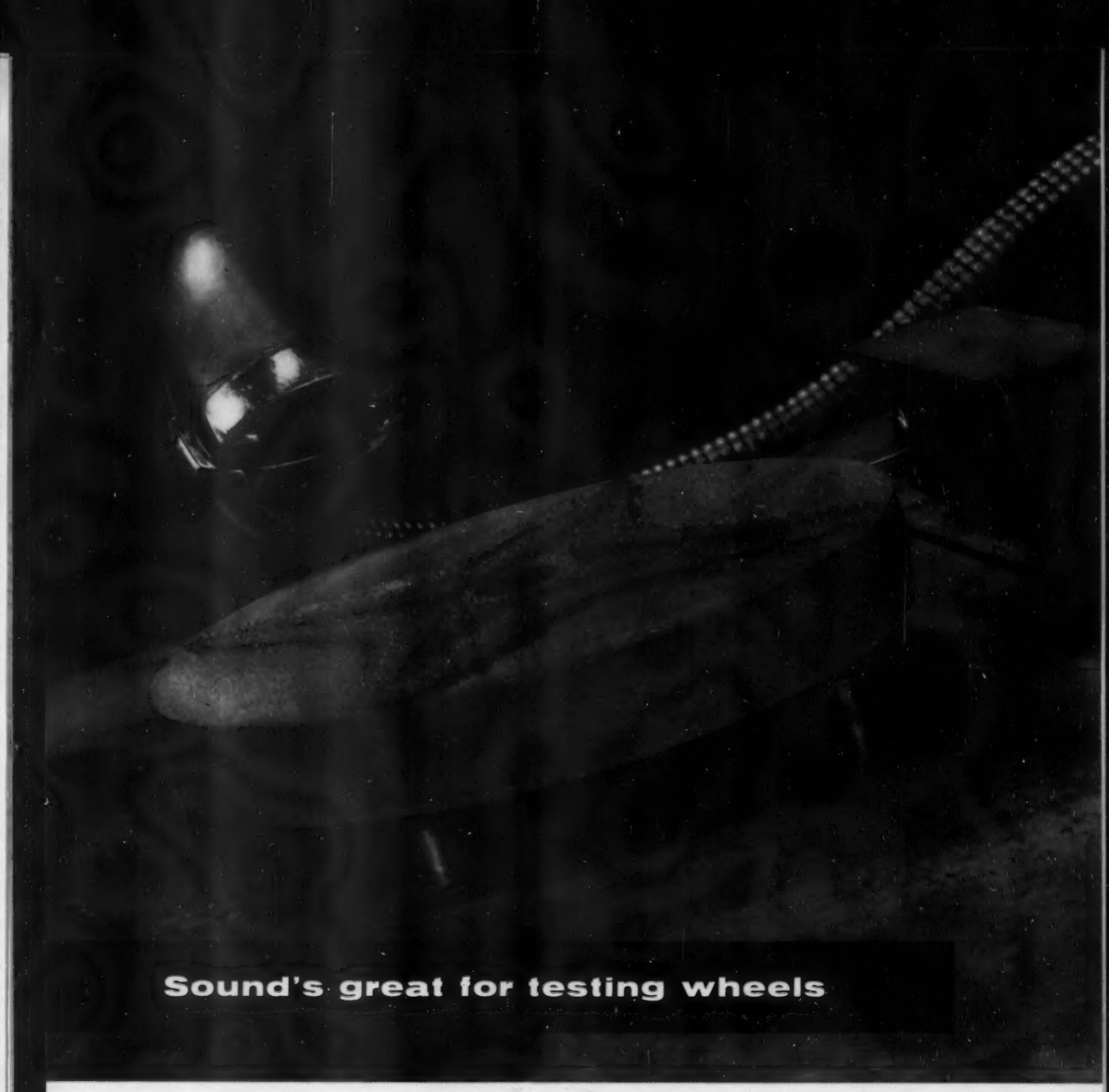
*Harper Electric Furnace Corp, 39P River St, Buffalo 2*

### Hankinson Dehydrafilter

Model CM-1 Dehydrafilter is a small, desiccant air and gas dehydrator designed especially for isolated pneumatic equipment.

Rated at 1 scfm at 100 psig and 70 F, unit consists of a head and case in which the disposable desiccant cartridge is inserted. Compressed air enters, flows downward around outside of cartridge, and upward through desiccant bed. Dry air leaves the unit after passing through a visual saturation indicator. Provides dewpoint as low as –67 F.

*Hankinson Corp, 117 Biltmore Bldg, 951 Banksville Rd, Pittsburgh 16*



## Sound's great for testing wheels

This is a "sand pattern" produced by the *sound* of a grinding wheel as it is vibrated on CARBORUNDUM's Sonic Comparator. This scientific instrument tests the hardness of wheels for precision grinding. Skilled operators hear—and see on the oscilloscope—the sound...grade with pinpoint accuracy from 250 to 300 wheels per hour. This is just one of many scientific tests applied to grinding wheels by CARBORUNDUM—to make sure you get absolutely uniform production from wheel to wheel. For precision grinding wheels that match the performance of modern grinding machines, it pays to rely on your CARBORUNDUM Distributor or Salesman. He offers expert counsel, complete stocks, prompt service. Call him today.

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# How to cut unit costs..and add to profits!

## Time study proves Alemite hand gun loading methods save 3¾ hours per 100 pounds of lubricant used

But, the 3¾-hours' saving is only the beginning! You also save on bearing replacements, costly repairs and downtime. Because only clean, fresh lubricant goes from drum to gun to bearing. Your machines can operate at peak efficiency—produce more per hour, more per dollar.

Alemite Hand Guns are equipped with a loader fitting which permits clean, quick mechanical refilling in a fraction of the time required for old-fashioned hand and paddle methods. The loader fitting is placed in the nozzle of an Alemite Loader Pump. Then—just 8 strokes of the pump refill a 1-lb. capacity gun . . . no mess, no waste!

And, there is an Alemite Loader Pump to fit any standard lubricant container you normally use—stationary models for 100-lb. and 400-lb. drums; portable models for 25-lb. or 35-lb. pails. These pumps keep original containers sealed tightly—prevent contamination, help reduce fire hazards.

*With Alemite Plan "A" Only Refinery Clean Lubricant Reaches Machines*

A drum of general purpose lubricant arrives in the oil room—clean, fresh from the refinery.

As soon as drum is opened, an Alemite Loader Pump for hand guns is inserted . . . completely re-sealing the lubricant against contamination.

The loader-pump nozzle readily engages the loader fitting on any Alemite gun. A few strokes of the pump fill the gun completely—no air pockets, no mess, no waste!

The Alemite hand gun is ready to deliver refinery-fresh lubricant to any machine—lubricant that has been kept free of dirt and abrasives all the way from barrel-to-bearing.

This combination of Alemite Hand Guns and Alemite Loader Pumps is known as Alemite Plan "A." It is one of five Alemite plans that your trained Alemite representative can show you. Ask him to tell you about the colorful, informative new sound-slide film, "No Margin for Error," which will help you and your men cut production costs. No obligation, of course!

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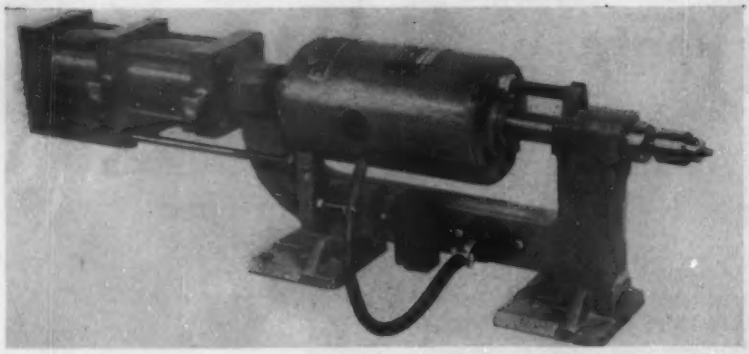


## Automatic Units Drill Small Holes

Designed for production drilling of holes from 0.004-in. dia to ⅛-in. dia and, in light metals, to ¼-in. dia, the spindle feed and speed of this automatic drill head are under separate control for any ratio of speed to feed. Said to be much more efficient than manual sensitive drilling, spindle travel is powered by an in-line two-way air cylinder and the feed rate is controlled by a closed hydraulic system. A ⅛-hp electric motor provides stepless direct spindle speed control in two ranges: from 1000 to 10,000 or from 2500 to 15,000 rpm. The drill head is mounted in a wide face, sturdy yoke casting to minimize side play, hence provide extremely accurate travel. The head will operate in any position; is suitable for automatic multiple-drill-head tooling.

In addition to these design characteristics, this unit provides: Instantly set drill speed, by simply positioning the speed control lever at the desired rpm on the spindle speed scale.

Rapid advance to the work through a double-acting air cylinder which supplies positive drive in both directions of spindle travel. In use, the air cylinder drives the quill toward the work at a high rate until the control bracket disengages the rapid advance adjustment nut. Then, just before the drill touches the work, a hydraulic resistance unit arrests the rapidly advancing quill to the proper feed rate.

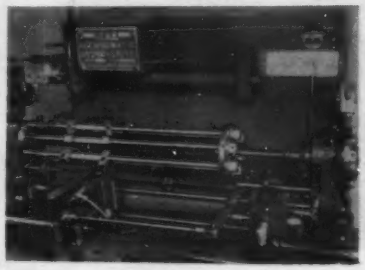
Proper feed rate through the work, achieved by a hydraulic resistance unit with a metering valve to control the rate of oil flow from one side of its piston to the other, is said to provide smooth, even travel through the part being drilled or reamed and smooth breakthrough. Fully adjustable, the hydraulic control has a minimum feed of 1 ipm and a maximum feed of 1 ips.

A positive depth stop, mechanical and readily adjustable, is located within ½ in. of the quill and works against the support casting. A dwell period at the end of the stroke is also available through the use of a time delay relay.

Rapid withdrawal from the work is accomplished by the double-acting air cylinder. Then the entire unit is immediately positioned for the next drilling cycle. The entire cycle is actuated by pushing a button.

For deep-hole drilling, an impulse timing device is available for use with the drill-head. It retracts the drill at one second intervals to clear chips. Also, a special relay box and double limit switch arrangement is available for two-step drilling.

*The Electro-Mechano Co, 261 East Erie St, Milwuakee*



### Lathe Drive Clears Chips In Deep-Hole Drilling

Drive for ram-design turret lathes, with automatic reciprocating action to clear chips in deep-hole drilling, has been introduced by Lincoln Industries.

Lynn Recipromatic Hydraulic-Drive provides an automatic cycle for withdrawing the deep-hole drill from the work to clear the chips. Drill then re-enters hole at rapid traverse to depth of cut and continues to drill at normal feed until chip-clearing cycle is repeated. This "recipromatic" action can be applied to any, or all, of the turret stations. Because chips are cleared automatically, at preset intervals, manufacturer claims that deep holes are drilled faster and more accurately, and that drills stand up longer.

All other turret stations are also driven by the Hydraulic-Drive to make the complete machining cycle automatic. After making the setup, which is claimed to be so simple and accurate that it is efficient on short runs, operator is required only to load and unload the machine.

*Lincoln Industries, 1121 South 7th St, Minneapolis, Minn*

### Simple Operation for Roller Lapping Machine

Precision roller-lapping machine will reportedly enable any shop personnel to lap metal, glass, or plastic plugs, rods, or pins from ⅛ up to 6 in. in dia quickly and easily. Finishes as fine as 2 rms or less may be obtained.

Equipment consists of two precision-ground cast-iron rollers with shafts extending on both sides, and revolving adjustable bearings. Rollers are parallel, 12 in. in length, one being 3 in. in dia and the other six. Larger roller is constructed with dual internal air chambers vented by 4 openings for each chamber. Both rollers by means of worm gear drive rotate in same direction, away from operator. Four-step pulley for V-belt permits varying rpm. Rollers can be adjusted and moved apart to accommodate different size work.

Machine has heavy steel base, 38 in. in height, and ½-hp motor is mounted on vertical slotted ways enclosed in the base.

No chucks or rings are used—work may be removed quickly and easily at any time for checking and measurement. In use, operator spreads abrasive compound over entire surfaces of both rollers. Simple notched fiber stick is employed for applying pressure to work. To lap small amount off particular section, fiber holder is held on longer.

*Spitfire Tool Co, 2931-35 N Pulaski Rd, Chicago 41*

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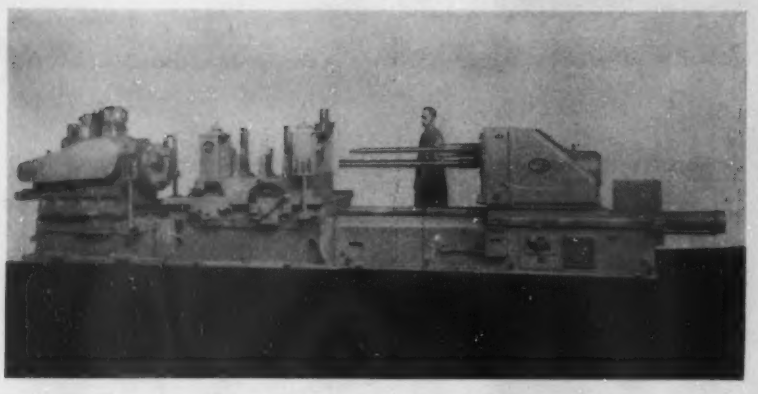


## Boreface Unit Performs Simultaneous Finish-Boring and Facing Operations

Boreface machine which incorporates simultaneous cam and crank finish-boring and facing operations has been announced by National Automatic Tool.

Unit, which employs two heads, speeds production of diesel engine blocks by finish-boring cam and crank holes, and boring and cross-feed facing flywheel case simultaneously. At 85% efficient, it completes 4.3 parts per hour.

Locations and diameters of the straight alignment bores are held to extremely close tolerances. Finish-facing on the flywheel housing and the cover is held square with the crankshaft bore to within 0.0025-in. total indicator reading. These tolerances are made possible by the built-in accuracy and because all operations are performed with one locating of the part.

RH head finish-bores 7 (in line) main bearings, oil retainer and cover, 4 (in line) camshaft bearing inserts and two holes, while at the same time LH head rough-, semi-finish-, and finish-bores and cross-feed faces the flywheel housing and cover.

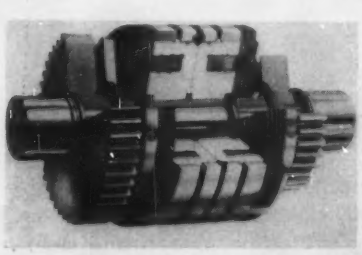
*National Automatic Tool Co, Richmond, Ind*

### Model 142 Tapping Attachment

Reversible unit has been developed for high-speed thread cutting with small taps.

Model has minimum of rotating parts; all gears are eliminated; axial ball-bearing functions as a planetary gear transmission for reversing. Drive clutches are of tapered design, and so combined with the axial ball-bearing that the tap can be started slowly in both directions, regardless of spindle speed. Manufactured to close tolerances and balanced for vibration-free motion, unit is available with Morse or Jacobs tapers as well as for cover clamping. Spindle can be furnished either with regular chuck or collet chuck.

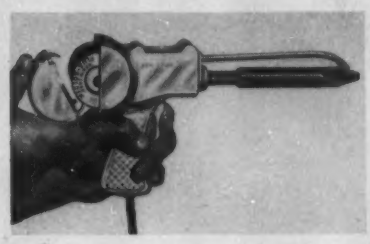
*Homestrand Inc, 9 Addison St, Larchmont, NY*



### Electromagnetic Clutch

I-T-E Clutch has been designed to fit requirements of transmissions using constant mesh gearing. Design provides constant horsepower output, quiet operation, and rapid speed change. Manufacturer states that safe, positive operation is assured because clutch is controlled by a 24-v dc circuit, and no field adjustment of the torque value can be made. Maintenance is reduced to a minimum since the unit is self-compensating, and no adjustment for wear of the plates is ever required.

*I-T-E Circuit Breaker Co, 1900 Hamilton St, Philadelphia 30*

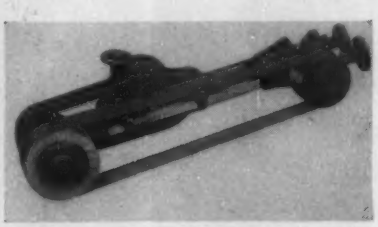


### Self-Feeding Soldering Gun

Scotty electric soldering gun feeds spool solder (either acid, resin, or plain) through the upper tube to the hot soldering tip. Solder strip, 1/16-in. or 3/32-in. dia. is accurately controlled by trigger action, allowing a small or large quantity, as required, to be fed to the tip.

Unit is equipped with either a wedge-shape, half-round for copper tubing, or a pointed soldering tip, the latter for use with explosive rivets. Also furnished with either 50, 100, or 150-w heating elements. Equipment, of lightweight aluminum construction, stands by itself.

*Scotco Products Co, Beverly, Mass*



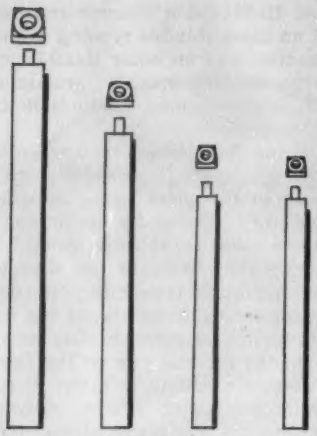
### Contact Wheel Belt Grinder

Model 500 contact wheel belt grinder is designed for flexibility, maneuverability, and is said to increase production 20% or more over previous grinding methods.

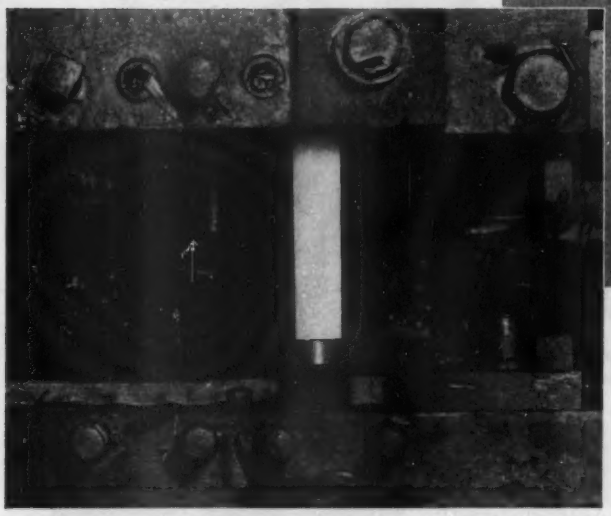
Unit, which can be mounted on a bench, pillar, or portable table, has an adjustment of 360° vertically, and is instantly adjustable to the most advantageous point for visual and physical comfort.

Steel, cast iron, bronze, aluminum, wood, and plastic can be finished.

*B & E Manufacturing Co, 407 Liberty St, Kansas City, Mo*



# A-L CUSTOMER FINDS SAGAMORE PUNCHES BEST IN TOOL-COST STUDY



Looking down on the SAGAMORE high speed cold nut punch in horizontal press.

An A-L customer tested various tool steels to determine the best for his varied cold-punching operations. New, air-hardening, non-deforming Ludlum Sagamore Die Steel was the ultimate choice. Here's why:

- The use of SAGAMORE cold-drawn stock eliminated the need for finish-grinding of the punches.
- Punches of SAGAMORE outperformed those of carbon-vanadium steel three to one.

The SAGAMORE punches were hardened by heating in a salt bath to 1750F. and air cooled. They were then given a double draw at 1110F. The resulting Rockwell hardness was 51C.

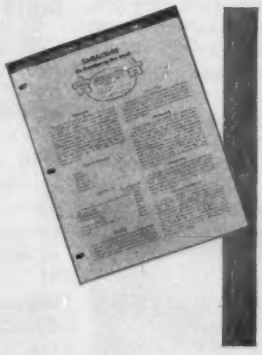
Characteristics of Ludlum SAGAMORE are: Excellent non-deforming properties, unusual toughness, lower hardening temperatures, and easier machining and grinding. These, plus the comparatively low cost, make it a good selection for this type of application.

For assistance with your tool or die steel problems, call your local A-L representative or distributor today, or write ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

**Write for your SAGAMORE BLUE SHEET**

This four page report was compiled from data collected in laboratory and field tests. Included is complete information on applications, physical characteristics, forging, annealing, hardening, tempering, etc. *Ask for your copy.*

**Address Dept. AM-59**

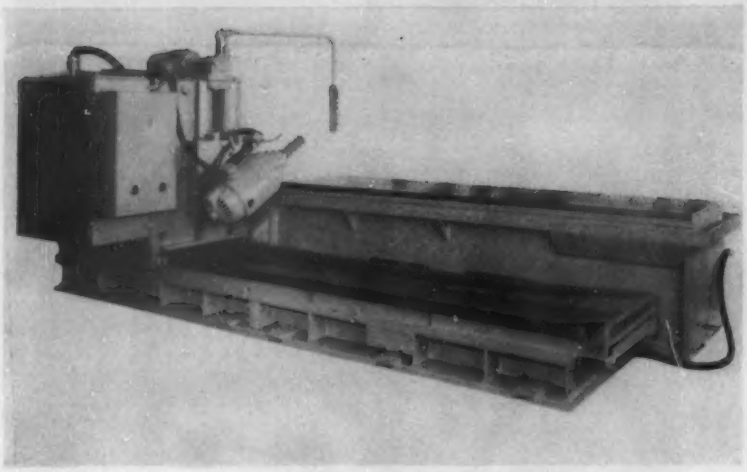


For complete **MODERN** Tooling, call

## Allegheny Ludlum

WAD 5328

AL® FINE TOOL STEELS SINCE 1854



## Scarf and Edge Milling Machines

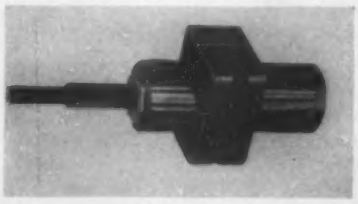
Ekstrom, Carlson has designed No. SM-100 open-side scarf and edge milling machine, primarily intended for use on non-ferrous metals.

Mounted on a vertical column, unit's horizontal spindle head can be adjusted to tilt a maximum of 30° either above or below the centerline. This spindle head is driven by a 15/30-hp, 1800/3600-rpm motor, and equipped with a No. 50 standard milling machine taper.

Large worktable surface measures 36 x 144 in., is furnished with three standard T-slots, and provides a 36-in. working height from floor to table top. Traveling on one "V" and one flat way, vertical column incorporates a variable feed rate ranging from 10 to 200 ipm; also jog-dynamic braking and rapid traverse. Both worktable and herringbone pinion rack are designed so that they may be extended at one or both ends, if necessary.

Machine is furnished complete with pushbutton controls for spindle head motor start and stop, rapid traverse of the column to either side, and a variable feed rheostat.

*Ekstrom, Carlson & Co, 1400 Railroad Ave, Dept M-1, Rockford, Ill*



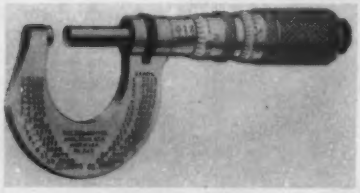
## Clamping Fixture Cylinder Has Non-Rotating Piston Rod

Square rod clamping fixture cylinder, called No-Ro-Fix, will reportedly save time and expense for shops designing their own guide rods for small clamping and locating fixtures.

Cylinder is supplied with a 1-in. bore, having a ⅛-in. pipe thread air connection, in 1, 2, 3, and 4-in. strokes, with spring return. Piston rod is supported by a long, oversize bronze bearing; seal is by standard O-ring. Mounting block permits adjustment of the cylinder to its full length in the block by loosening one screw, reducing setup time to an absolute minimum, and permitting an easier fixture manufacturing job. Block is drilled to receive two No. 10 socket-head cap screws.

Construction details are contained in Bulletin No. 301.

*Beckett-Harcum Co, 1087 Wayne Rd, Wilmington, Ohio*



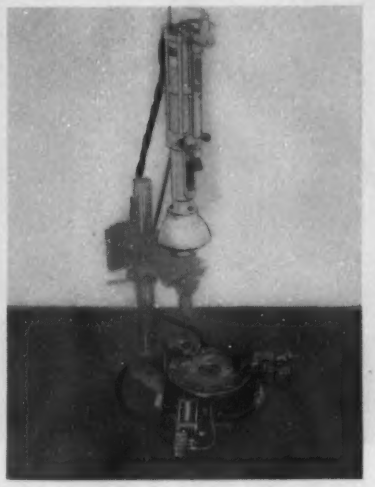
## Micrometer Caliper Reads Direct In Ten-Thousandths of an Inch

Micrometer caliper with automatic spindle control, has been introduced which reads direct in ten-thousandths of an inch.

Instrument incorporates the Starrett Hi-Precision thimble consisting of an inner thimble reading in thousandths, and an outer thimble with large, widely-spaced graduations which gives direct readings in ten-thousandths.

Using the micrometer conventionally, measuring faces are brought up snug to the piece being measured, and then loaded by continuing to rotate the outer thimble through approximately nine to ten divisions. Outer thimble is permitted to return under spring tension until the 0.001 graduation on inner thimble lines up with the reading line on the sleeve. The 0.001 reading is taken directly from the outer sleeve. Accuracy throughout the range of the device is within 0.00005 in.; range is 0 to 1 in.

*L S Starrett Co, Athol, Mass*



## Drill Feed Control Valve

Control valve has been designed for automatic synchronization of indexing of a rotary table to the General automatic drill feed.

When used in conjunction with the drill feed it is said to provide insurance against tool breakage. Elimination of electrical switches or other timing devices permits abundant use of coolants without normal hazards of shock and fire. Any change of adjustment on the feed can be made during drilling cycle without affecting rotary table, as it indexes only at completion of feed cycle.

Valves are available for use with both Model A and D drill feeds, which can be adapted to conventional drillpresses, as well as to most rotary tables on the market.

*General Pacific Corp, Machine Tool Div, 1501 E Washington Blvd, Los Angeles*

The precise pitch of this wire helix, in its glass tube, is accurately measured by Hewlett-Packard Company, using a Kodak Contour Projector.

# to make the difficult easy

# ...the easy economical

Using the same contour projector, Hewlett-Packard checks spacing and parallelism of this special tuning condenser.

## *Hewlett-Packard relies on the Kodak Contour Projector*

Here is an on-the-job demonstration of how projection gaging can solve difficult problems in inspection, slash costs in checking parts to close tolerances.

Using a Kodak Contour Projector, Hewlett-Packard Company measures the pitch of a precision wire helix for a unique electronic tube. Surface and shadow illumination provide a 20× enlarged image of the minute and delicate part. "Without the Kodak Contour Projector," say Hewlett-Packard officials, "it would not be practical to make the measurements necessary to get a satisfactory instrument."

Using the same contour projector, Hewlett-Packard also checks spacing and parallelism of a special tuning condenser for electronic test equipment. Conventional shadow projection provides a 10× enlarged image of the leaves. "Use of the projector," the company reports, "permits economical measurements of parallelism to an accuracy impossible to obtain by other methods."

Diverse jobs like this are easily done with a Kodak Contour Projector. A twist of a dial provides whatever magnification is needed. A flick of a switch brings surface illumination to supplement shadow projection. Easy to see, isn't it, how a Kodak Contour Projector quickly pays for itself in use.

For more information on how you can use projection gaging in your own work, send for a free copy of "Kodak Contour Projectors."

**EASTMAN KODAK COMPANY**
**Special Products Sales Division**
**Rochester 4, N. Y.**

## the KODAK CONTOUR PROJECTOR

Kodak

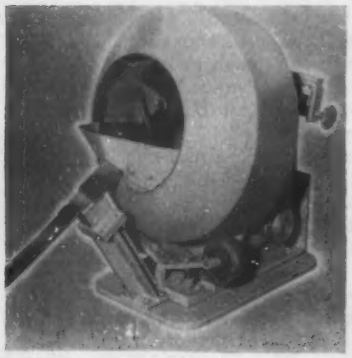
## Sheffield Air Gage Inspects 12 ID's Simultaneously

Multi-column air gage inspects 12 internal diameters simultaneously in an automobile transmission valve body.

Unit consists of a work-holding and locating device on which are mounted six air spindles connected to a 12-column Precisionaire. Two spindles, step design, have two sets of orifices to check two different diameters when in gaging position.

Operator places valve body on locating block and brings spindles into the part by rotating a hand lever a half-turn. Floats in the Precisionaire instantly show which diameters are within tolerance, or how much they are over- or undersize.

*The Sheffield Corp, Dayton 1, Ohio*



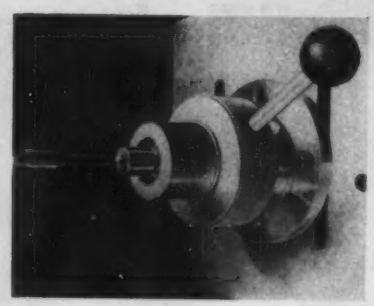
## Automatic Parts Feeder

Model 400 Tumble Hopper has been added to the Feedall line of mechanical hopper feeds.

The 24-in.-dia unit pictured, largest of three sizes available, is self-contained, mounted on a flat base. Powered with a ¼-hp, 3-phase motor, production rate is high and variable by means of the integrally built-in variable drive.

Designed for feeding a variety of parts at a high feed rate, model is readily adaptable to assembly presses, counterless grinders, secondary-operation machines, or other high-production machinery. Range of work to be fed includes: washers, nut blanks, nuts, special stampings, and headed parts up to ½-in.-dia.

*Feedall Machine & Engineering Co, 38399 Pelton Rd, Willoughby, Ohio*



## Precision Collet Chuck

Regal 5C collet chuck has a maximum 1-in. capacity and uses standard 5C collets now applicable to small lathes, such as 9-in. South Bend, 10-in. Atlas, 10-in. Logan, 10-in. Sheldon, and other machines. Permits full spindle capacity of these units.

Model has precision features which make the chuck as concentric as the bearing of the lathe or machine. Said to eliminate errors of spindle and collet sleeve. Ball bearings permit ease in applying greater holding pressure. Can also be used as a holding fixture on drillpresses, horizontal and vertical milling machines, and jig borers. Removable handle for fixture work requires only a quarter-turn to tighten or loosen workpiece.

*Royal Products, 88 Union St, Mineola, LI, NY*

## New Collet Chuck Cuts Setup Time

Hancock Chukollet is so constructed that it cannot dislocate the work, as the collet is not drawn in while closing. It is reportedly more versatile than any other collect chuck, and makes the standard 5C collet useful on any machine throughout the shop.

Can be used on lathes (especially for machining eccentric parts), mills, drillpresses, dividing heads, super spacers, surface grinders and cylindrical, 2, 3, 4, and 6-jaw chuck or set in a vise at any angle, as illustrated.

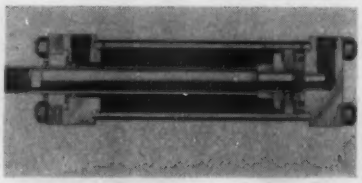
Device can hold soft threaded parts and thin-walled cylindrical parts without damage while machining. Furnished with an adjustable internal stop, which positively locates the work axially.

*Hancock Mfg Co, Santa Clara, Calif*

## Aluminum Alloy Setup Blocks

Used for setup of jig borers, boring mills, drillpresses, milling machines, and planers, these aluminum alloy setup blocks hold work from zero to 3-in. and can be mounted on 3-in.-high Jergens risers and thus pyramided from zero to any desired height. It is said that the T-shape of the riser block requires minimum table space and allows rotation of the setup block to coincide with the sturdy T-base for maximum rigidity. The setup block is positively locked to the riser by means of a male boss and female cavity. Blocks are packaged in sets of four—two multi-step blocks and two risers.

*Jergens Tool Specialty Co, 712 E 163rd St, Cleveland 10*



## 2000 psi Hydraulic Cylinders Built to JIC Standards

"Compact" hydraulic cylinders are designed and built to JIC standards, and are intended to occupy minimum space through use of square rod-end and head-end caps. Cylinders can be furnished with adjustable hydraulic cushions on either or both ends, to de-celerate piston rod movement.

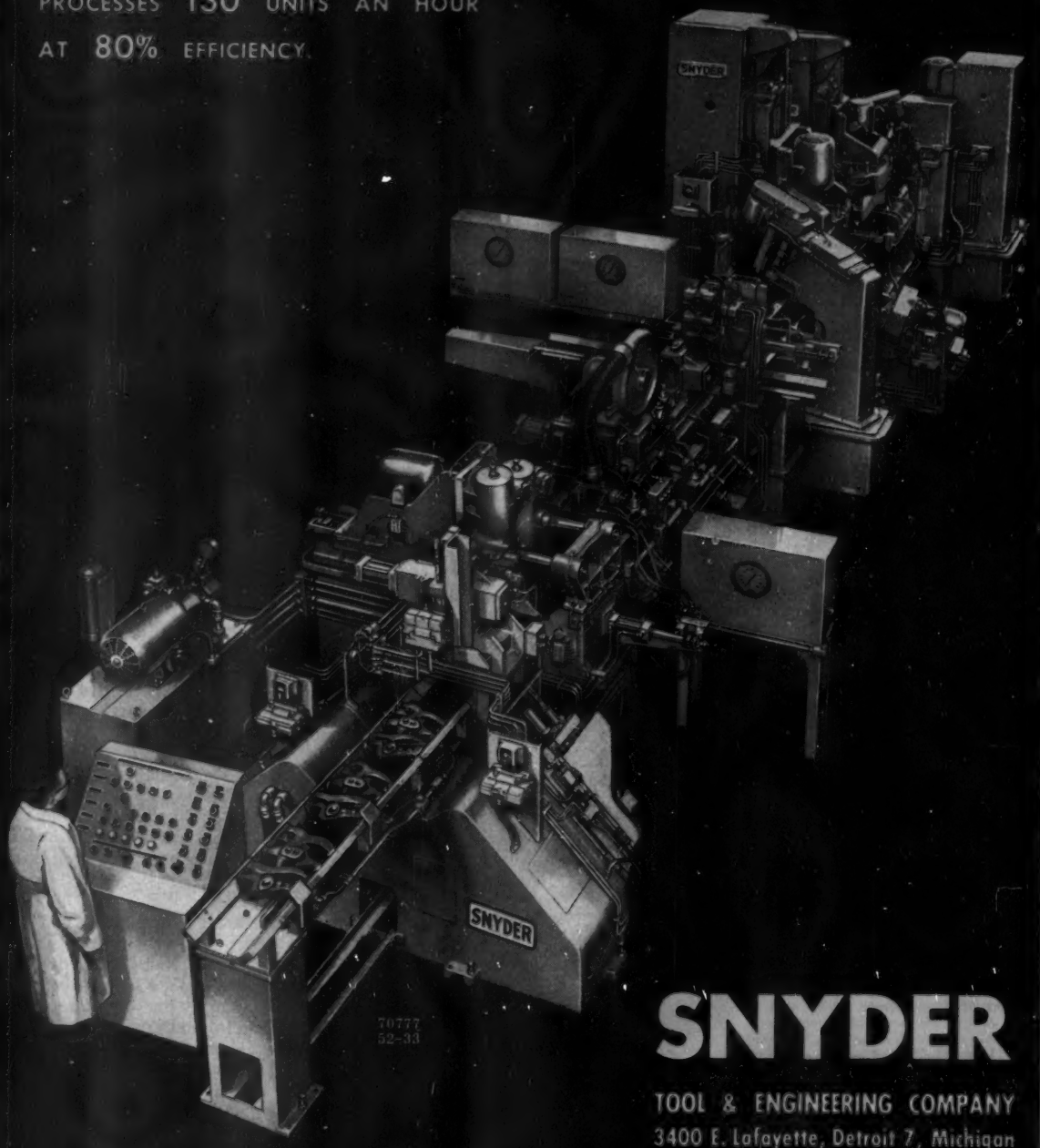
Ports can be independently rotated to any 90° position in relation to the mounting. Cylinder barrel can be rotated so ball-and-setscrew air vents (provided when specified) are at top, regardless of mounting position.

Sizes range from 1½ to 6-in. bore, with standard or HD piston rods. Rod wiper is formed from twin bronze knife-edged rings with synthetic cushion at rod ends. Maximum rated operating pressure is 2000 psi.

*Vickers Inc, 1400 Oakman Blvd, Detroit 32*

# SNYDER SPECIAL 21-STATION AUTOMATIC LINE

**TRANSFER** MILLS, DRILLS, CORE-DRILLS, REAMS AND TAPS INTAKE MANIFOLDS; TESTS MANIFOLD FOR AIR LEAKAGE AND VOLUMETRIC AIR FLOW, INSPECTS PROCESSING PROGRESSIVELY, MARKS REJECTS; INSERTS HEATER TUBES; PROCESSES 130 UNITS AN HOUR AT 80% EFFICIENCY.

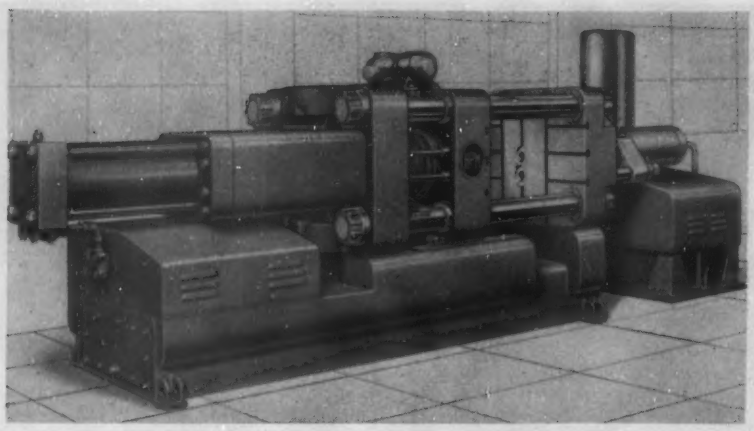



**SNYDER**

TOOL & ENGINEERING COMPANY

3400 E. Lafayette, Detroit 7, Michigan

*29 Years of Successful Cooperation with Leading American Industries*



## Die-Casting Machine Has Auto Clamp, Self-Contained Package Power Unit

Die-casting machine is made in capacities from 200 to 1000 tons for cold chamber models, and 100 to 600 tons for gooseneck types. New clamp design is intended to preload clamp to limit, and prevent die blow on overload or with off-center loads. Automatic lubrication uses moly-sulphide products over large area.

Injection end is self-contained unit with pump, motor, and reservoir. Speed control operating valve allows variable acceleration and control to metal plunger.

*Hydraulic Press Mfg Co, Mt Gilead, Ohio*

### Flat Feet for Jigs and Fixtures

Line of standard components, called Flat Feet, provides a thin, comparatively large-diameter rest pad for use as feet on the bottom of jigs and fixtures for easier handling.

Available in six sizes, ½ to 1⅝ in. in diameter, and ⅛ to ⅜ in. thick, pads are carburized and hardened to 56 Rockwell. Said to have a longer wear surface, and can be used for cutter setting blocks on milling fixtures. Furnished complete with flat head socket head screws.

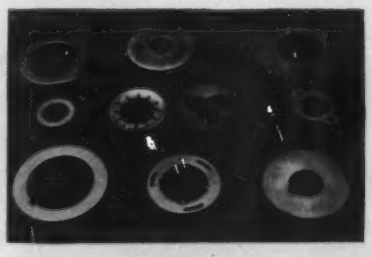
*Jergens Tool Specialty Co, 712 E 163rd St, Cleveland*

### Bucket Trolley Conveyor

The conveyor trolley consists of a single I-beam, which may lie in a horizontal, inclined, or vertical position, or include sections in all three directions. In addition, conveyor path may have turns in either or both horizontal or vertical planes. A universal-type chain runs parallel to the I-beam with standard roller attachments.

A second "Stif-Arm" brace holds the bucket trunnions at a fixed distance from trolley chain and beam, preventing buckets from swinging loosely against the chain and spilling their contents on vertical or inverted runs. Instead, buckets rotate around their trunnions to remain upright at all times until they reach tipping rollers at discharge points.

*Hapman Conveyors, Inc, Kalamazoo, Mich*



### Contract Metal Stamping Work

Additional line of custom made special die-cut washers has been announced by Dayton Rogers.

Various types of thrust washers, with special OD's and ID's from such materials as bronze, bakelite, brass, and any type of alloy sheet steel can be produced from sizes of ⅛ to 20 in., with maximum blanking pressure of 295 tons.

Under this method concentricity is assured and in a number of cases universal tooling can be applied, reducing production costs of tooling to a minimum.

*Dayton Rogers Manufacturing Co, 2824 13th Ave South, Minneapolis 7*

### Dry Spray Lubricant

Drawcote Formula No. 1004 is a dry lubricant developed for use in spray coating applications. Can also be applied by brushing, dipping, or rolling. Since compound almost air-dries, it is claimed that the drying unit can be much shorter, reducing necessary floor space. Product is said to eliminate danger of blank adherence, giving greater die and press protection.

*Gilron Products Co, 452 Hanna Bldg, Cleveland 15*

### Hydraulic Index Table Has Built-In Safety Features

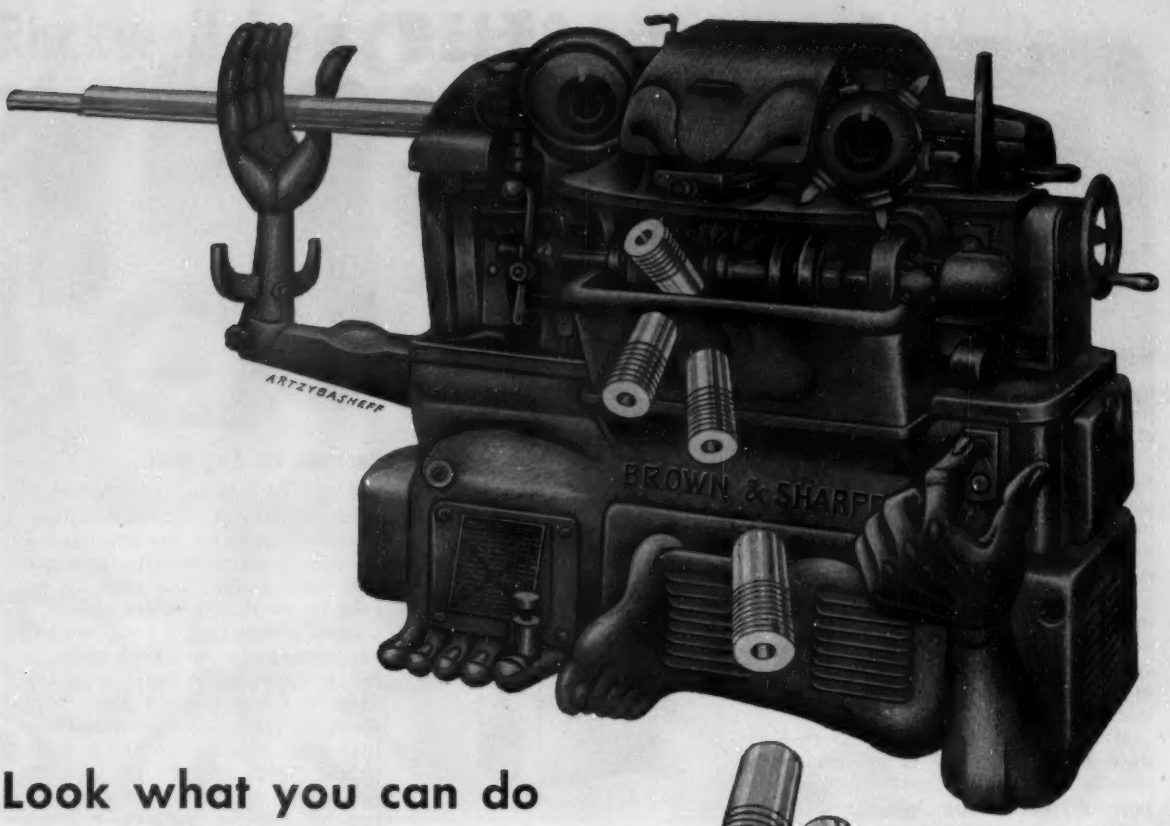
Index table is hydraulically operated, with a positive location from a tapered shot bolt. Shot bolt is operated from a hydraulic cylinder with a pressure relief valve to control amount of pressure applied to bolt.

Unit is driven by a fluid-drive motor. Should the drill head engage the fixture while table is operating, it will stop automatically; oil in the motor will not drive table when it meets any resistance. Driving load is controlled from the fastest point on the table.

Decelerating valve shuts off oil supply just before shot bolt is placed in the cup, thereby providing smooth operation. Gradual closing of the oil supply prevents any shock to the shot bolt. Oil for operating can be taken from any other hydraulic source on the machine because feeding units are stationary during indexing.

Available in four sizes: 20, 30, 42, and 60 in.; can be bored for any number of stations ranging from two to fifteen.

*Michigan Drill Head Co, Hazel Park, Detroit 34*

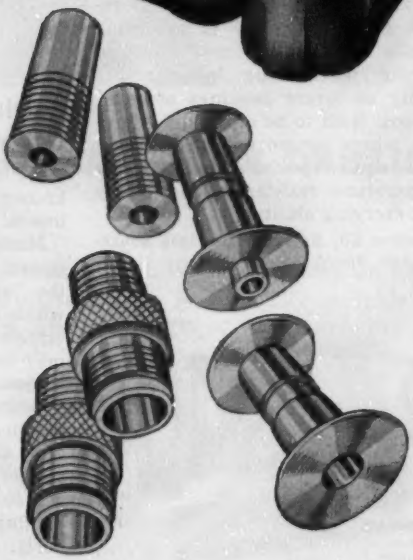


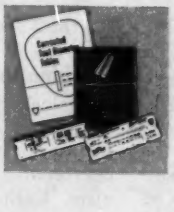

# Look what you can do with Alcoa® Aluminum on your Brown & Sharpe automatics

196 two-speed combinations provide the spindle on No. 2G Brown & Sharpe automatic screw machines a wide selection of ratios. These make possible the use of proper threading speeds with no limitation on top speeds for forming, drilling and similar operations.

What's more, with Alcoa Aluminum Screw Machine Stock, you can utilize maximum spindle speeds, which, for a No. 2G having a one-inch capacity spindle, is 3025 rpm. Finishes are smooth with tolerances consistently uniform. Piece costs are lower, since from a pound of aluminum you can get three times as many parts as from a pound of the heavier metals. Aluminum parts are excellent conductors of electricity and heat, and are highly resistant to rust and corrosion.

Find out now what Alcoa Aluminum Screw Machine Stock can do for your products. Contact your local Alcoa sales engineer or Alcoa distributor, both listed under "Aluminum" in the classified section of your telephone directory. Or write, ALUMINUM COMPANY OF AMERICA, 874-G Alcoa Building, Pittsburgh 19, Pa.

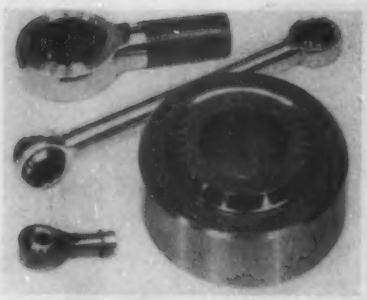




**PRODUCTION AND DESIGN ENGINEERS will want two Alcoa booklets, *Alcoa Aluminum in Automatic Screw Machines* and *Corrected Tool Diameter Tables*. Also available at no extra cost are two precision computers —a Speed-Feed calculator, and an alloy property guide which shows at a glance the various properties of Alcoa Aluminum Screw Machine Stock.**

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA



## New Spherical Bearing Design

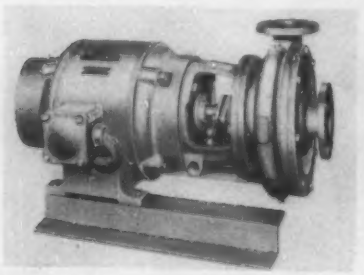
Delron spherical bearing is designed for heavier loads and a wider range of usable materials.

Bearing is produced as two pieces by a method which requires no swaging operations for assembly. Elimination of this process provides better bearing area, and heavier allowable radial and axial loads.

Product is being manufactured in many configurations, including rod ends, and sizes up to No. 16, and can be constructed in a wide variety of materials, rather than being limited to those capable of deformation.

Manufacturers reportedly can reduce size and weight of mounting installations by using smaller Delron bearing with same load-carrying ability as larger bearings of other designs. Said to be especially adaptable where severe operating conditions require special materials, high-temperature resistance, and heavy load-carrying ability.

*Delron Co, Bearing Div, 5224 Southern Ave, South Gate, Calif*



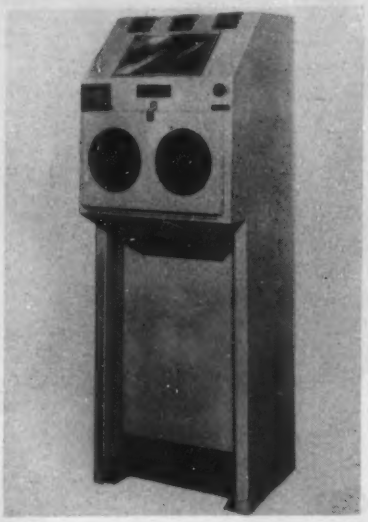
## Interchangeable Units Give Pumps Wide Range of Capacities

Design of pumps gives customer choice of capacity from fractional to 600 gpm by selection of various "off-the-shelf" units which comprise the pump. Units are made of nickel-chrome alloys, to resist corrosion of normally difficult-to-handle liquids.

Starting with the basic pump, customer can specify kind of lubrication, bearings, seals, and impellers. Also, several shaft constructions and two pedestal heights are available. If changes are desired at any time, parts for conversion can be ordered and installed in the field.

Bearing types are: permanent-seal double width; replenishable grease; and oil-lubricated. Seals are either packed stuffing box or mechanical. Shafts can be either general-purpose or extra-rigid. Impellers are semi-open or closed.

*Ampco Metal, Inc, Milwaukee 46*



## Cro-Plate Adds Low-Cost Unit To Wet-Blast Equipment Line

Cro-Plate has added a new model, known as Pressure Blast, Jr, to its line of wet-blast equipment.

Model, said to be low-cost, is designed for multi-unit installation in the larger plant or smaller shop where compressed air supply for operation of this kind of equipment may be low. It may be operated in conjunction with a 3-hp compressor.

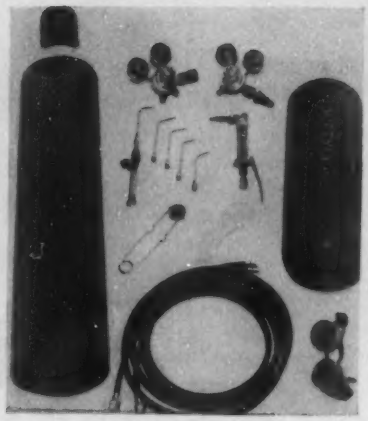
Features include: motor-driven paddle-design agitator for the water and abrasive mix; self-supporting trigger gun; foot pedal window wash actuator; large, single-front work-loading door with open-end arm-ports; special standpipe for better solution maintenance.

*The Cro-Plate Co, 747 Windsor St, Hartford 5, Conn*

## Combination Vernier Caliper

Microlock features a new design combining advantages of quick adjustment and rigid tightness with micrometric fine-adjustment mechanism. Caliper is said to be ideal for use as height gage. This is accomplished by adding sturdy base and scribing attachment with adjustable scriber.

*George Scherr Co, Inc, 200 Lafayette St, New York, NY*



## Portable Welding Unit

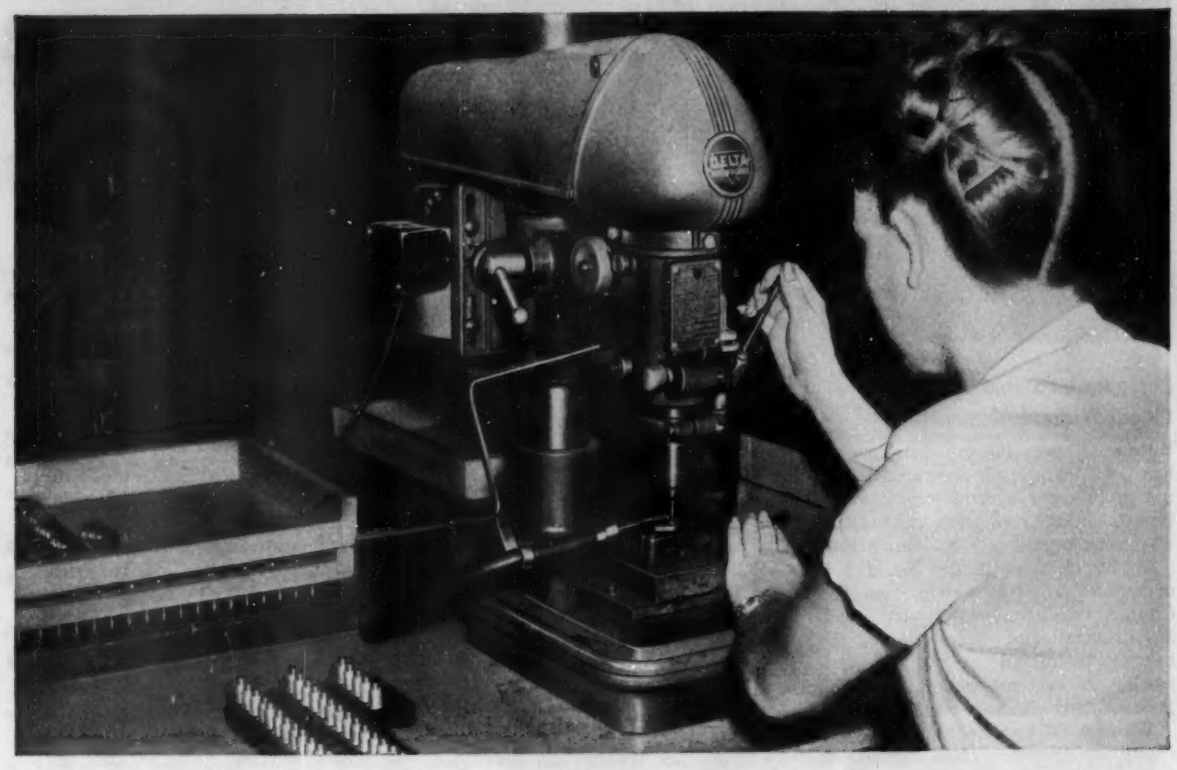
Harvey Aluminum of Torrance, Calif, working in conjunction with Burdett Oxygen Co, has developed a compact portable welding unit for light gas welding. Assembly can be used for aluminum alloys.

Basic unit consists of a full 80-cu-ft oxygen cylinder weighing 73 lb; a full B acetylene cylinder weighing 35 lb; and the accessory group consisting of torch and tips, regulators, twin hose, goggles, wrench and file lighter (combined weight 17 lb). Additional equipment, such as cutting attachments, portable cylinder carts, larger cylinders, etc, are optional.

*Burdett Oxygen Co of California, 2014 Belgrave Ave, Huntington Park, Calif*

MODEL FS-1A COOLANT SYSTEM provides 2 gpm water fluid at 5 ft working head and No 10 oil at reduced capacities. Furnished with 3½-gal. rust-resistant steel container; 6-ft oil-resistant oil hose; bronze valve and nozzle; 6-ft cord and plug; heavy-duty switch; 1/30-hp shaded pole motor, available in 110 and 220 v. Pump has a built-in removable strainer—*Easy Industries, 162 N Clinton St, Chicago 6*

# Rockwell-built **DELTA** Sensitive Drill Press



# High-Speed Economy **IN SMALL-HOLE DRILLING**

THE famous Rockwell-built Delta Super-Hi Drill Press, with 3 speeds up to 12,000 RPM, is specially engineered to give you the speed, the accuracy, the sensitive control you need to meet the special problems of small-hole drilling.

Created specifically for high-speed drilling of holes from ¼" down to #72 (.025"), it does the job quicker—turning out a better quality product —than standard drill presses. And in addition, the specialized Delta design keeps drill breakage to an absolute minimum. While recommended for all drillable materials, it is especially suitable for phenolics, aluminum, copper, brass and the precious metals.

*Let your Delta dealer demonstrate how Delta Super-Hi Drill Presses can cut costs in your particular operation. Call him today—he's listed under "TOOLS" or "MACHINERY" in the classified pages of your phone book—or send the coupon for complete catalog information.*

**DELTA 12,000 rpm Super-Hi Drill Press**

**$195.00***

***complete with motor and switch rod.***
***Multiple Spindle Models Available.***

Super-Hi head fits any standard 2¾" dia. drill press column.

*Prices slightly higher in western region

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DELTA ROCKWELL **DELTA** QUALITY POWER TOOLS
Another Product by **Rockwell**

Delta Power Tool Division, Rockwell Manufacturing Company
618L North Lexington Avenue, Pittsburgh 8, Pa.

☐ Please send catalog information on Delta Super-Hi Drill Presses.
☐ Please send name of my nearest Delta Dealer.

Name_____ Title_____

Company_____

Address_____

City_____ County_____ State_____

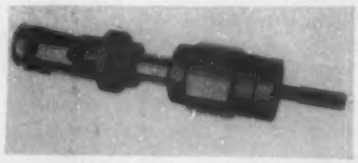
## Portable Jet Steam Sprayer Cleans Without Dismantling

Henry "Steam Kleen" jet sprayer has been introduced for rapid cleaning of motors, compressors, condensers, machinery, engines, small parts, without the necessity of dismantling.

Mighty Midget Model No. 111 is operated by finger-tip control. Changeover from wet to dry steam is instantaneous, accomplished by merely tilting the unit from horizontal to vertical position. It degreases as it cleans.

Weight is approximately 16 lb, ready for operation; has capacity of ½ gal. of water, and can be brought up to operating temperature and pressure in 20 minutes, using cold water. Normal cleaning is approximately 20 minutes. Unit is electrically heated, thermostatically controlled, and operates on any 110 and 115-v circuit.

*Henry Flow Control Co, Melrose Park, Ill*



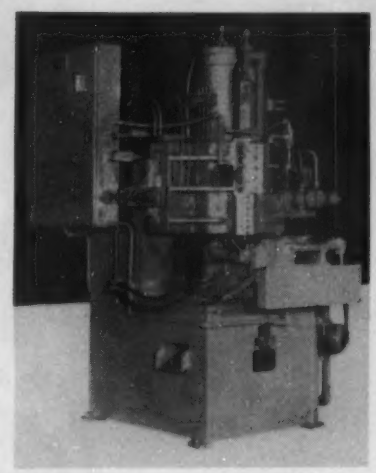
## Adjustable-Torque Driver For Leadscrew Tapping

Special releasing driver has been designed with a spring-loaded shank to accommodate leadscrew tapping.

Adjustable-torque clutch mechanism operates on Scully-Jones' "safe torque" principle, reportedly assuring complete release and eliminating friction, heat, wear, and impact action. There are no slipping friction surfaces or overriding teeth; roller drive provides free-wheeling releasing action, protects threads, and prevents changes in torque settings due to friction and heat.

Driver may be preset to release when machining torque approaches strength limits of tap under required operating conditions. Results show increases in tap life as high as 500% on some jobs, according to the manufacturer.

*Scully-Jones & Co, 1901 S Rockwell St, Chicago 8*



## Swift's Two-Machine Process Welds, Trims Transmission Bands

Swift Electric Welder has developed a special two-machine process for the welding and trimming of transmission bands which involves the joining of bands to forgings. Welding machine welds the band to the forging, while a vertical broaching machine alongside performs trimming operation.

Powered by a 75 KVA transformer, welder incorporates a motor-driven cam for push up, air-operated clamps, and sequentially geared automatic flash and upset.

Vertical broaching machine is hydraulically operated with self-contained hydraulic system, and hardened and ground wear plates. Multi-tooth broach trims the part practically to gage, or it can be set to undercut. To prolong tool life, flash is removed while metal is still hot.

In the welding of transmission bands (approximately 2 x ⅛in.) to a forging in two places, a production line of two welders and two trimmers is commonly employed. First weld is made and trimmed, and then second weld made and trimmed.

While these units have been especially developed for bands used in automatic transmissions, they are also adaptable for many other applications involving rings, tubes, and similar joining operations.

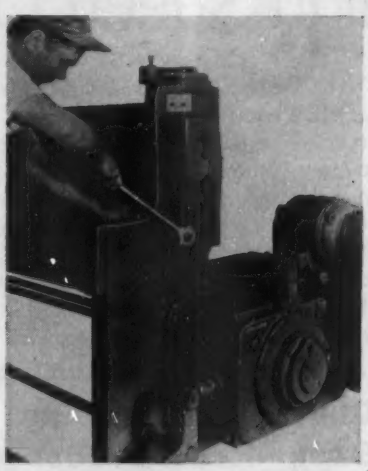
*Swift Electric Welder Co, 8095 Livernois, Detroit 4*

## Hand Press Brake Bends 3/16-in. Mild Steel

Compact sheet-metal brake takes 18-gage sheets up to 26 in. wide, 3/16-in. mild steel 1¼ in. wide, and anything proportionately in between. Flanges at 180° may be made 1¼ in. wide and any width may be formed up to 164°.

Segmented upper mandrel fingers allow bending radii from 1/32 to 1/2 in. and may be removed to allow bending only parts of a sheet. Angle stop and back gage are provided so cleats, double hems, tracks, or square and round tube may be bent.

*R A Smith, 1122 Elizabeth Ave, Waukegan, Ill*



## Wysong Improves Drive Unit For Power Squaring Shears

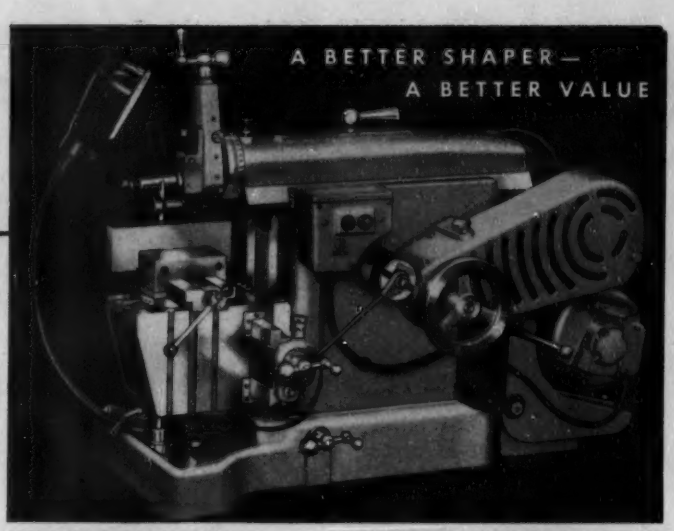
Redesigned drive unit for all power squaring shears in the Wysong line eliminates a long pinion shaft. Because gears run in oil, wear is greatly reduced.

Bed-belts are placed on the outside of the end frames to make blade setting easier. Unit is fully enclosed.

*Wysong & Miles Co, Greensboro, NC*

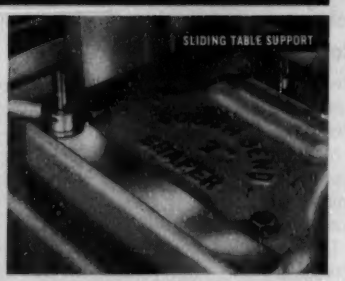
IMPROVED

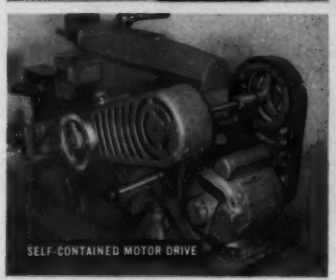
# SOUTH BEND 7" SHAPER



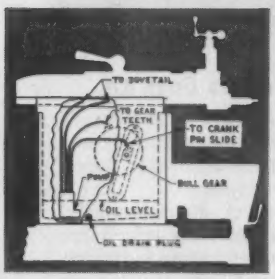

## Compare These Value-Adding Features:

- Extreme precision for the most exacting tolerances.
- Convenient controls for easy handling.
- Ample bearing surfaces assure rigidity and durability.
- Powerful built-in V-belt motor drive.
- Smooth, quiet operation at all speeds.
- Quick acting belt tension release for changing speeds.
- Table sliding support shoe.
- Convenient length of stroke adjustment graduated 0 to 7".
- Reversible power cross-feeds .002" to .012".
- Graduated eccentric indicating power feed in thousandths.
- Swivel vise graduated in degrees mounts on top or side of table.
- Swivel tool head graduated in degrees, locks at any angle.
- Price $551 f.o.b. factory, less motor.

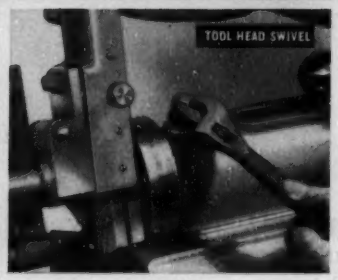


## ONLY 7" Shaper with Pressure Lubrication




Pressure lubrication of ram dovetail bearings, bull gear teeth and crank pin slide bearings keeps wear to a minimum, helps absorb shock of intermittent cuts. Flood lubrication of all other important bearings.

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**OUR PRICES ARE LOWER**
**than they were back in 1941**

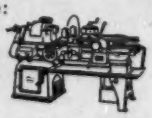
Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

**PLEASE SEND INFORMATION CHECKED:**

☐ 9" and 10" BENCH LATHES

☐ 10" to 16-24" FLOOR LATHES

☐ DRILL PRESSES



☐ ½" & 1" Collet TURRET LATHES

☐ TOOL GRINDERS

☐ 7" BENCH SHAPERS

Name_____ Street_____

City_____ State_____

*Building Better Tools Since 1906* • **SOUTH BEND LATHE** • South Bend 22, Indiana

## Leiman Sand-Blasting Machine Has New Design Features

Redesigned sand-blasting machine has been announced by Leiman Bros. Features include extra-large, full-width viewing glass, providing full vision of interior; streamlined, fully enclosed cabinet design; movable nozzle suspended from top of cabinet.

Unit is available in three stock sizes: 18x24 in., 30x36 in., and 24x60 in., or custom built to order. Also available with automatic feed for small parts, such as nuts and bolts, in gross quantities.

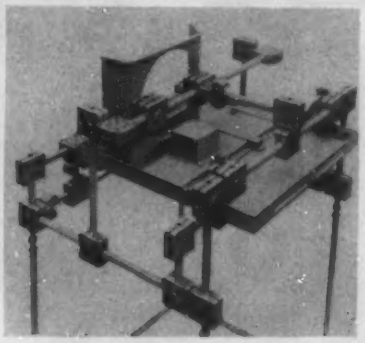
*Leiman Bros, Inc, 146 Christie St, Newark 5, NJ*

## High Feed Cutter Mills Cast Iron at 100 ipm

Inserted blade milling cutter, Series 7200, is capable of feeds in excess of 100 ipm and employs over four blades per inch of diameter.

Designed for high-feed, cast iron finishing, cutter consists of a hardened steel body with broached blade slots, Wessonmetal carbide-tipped blades, and hardened steel wedges. Wedge applied beneath the blade raises it, causing blade and body serrations or grooves to lock against each other for positive, firm positioning. It is this Rigid-cut principle, combined with a specially designed blade over 1 in. high with large steps or grooves that is employed in the series, making four blades per inch possible. Available in diameters from 6 to 20 in.

*Wesson Co, 1220 Woodward Heights Blvd, Detroit 20*



## Unitube Jigs-and-Fixtures System Substitute for Welded Structures

"Unitube" jigs and fixtures are intended as a substitute for welded structures when making welding and assembly fixtures, as well as for machining and drilling jigs.

Tubes and other elements of fixtures can be dismantled and re-used when production run is completed. Typical assembly time for fixtures is said to be 2 to 4 hours.

Tubing is made from high-tensile octagonal tube drawn to prescribed tolerances, with the octagon giving positive locating for attached parts. Frame joint elements form anchorages for 2- to 6-way directional fastening.

*Wharton and Wilcocks of America, Inc, 17 Battery Pl, New York 4*

## Aluminum Torpedo Level

Die-cast aluminum torpedo level, reputed to be unusually accurate and shock-resistant, has been developed by Columbian Vise.

Columbian 339 has one plumb, one level, and one 45° vial. Top plate is made of shock-proof plastic; bottom of the aluminum body is precision-grooved to permit use as a line level. Unit is 9 in. long, 1⅛ in. high, and only ⅝ in. wide at widest point. Individually packaged in plastic sleeves, packed 6 to a shipping carton.

*Columbian Vise & Mfg Co, 9021 Bessemer Ave, Cleveland 4*

## New Var'A'Cone Pulley Offers A 2:1 Speed Ratio up to 1/3 hp

Small, compact No. 30 has been added to the Var'A'Cone line of variable pitch motor pulleys. Model is particularly designed for blowers, conveyors, and various types of low-cost machinery on which infinite and automatic variable speed is desired.

Standard "A" section belts are used; maximum horsepower rating is 1/3 at 1750 rpm. Additional features include: cast-iron machined for durability; no interlocking disks to chew up belts; oil-impregnated bearings; through-shaft mounting easily accomplished.

*Gerbing Mfg Corp, Northbrook, Ill*

## Adjustable Airebore Gage Kit

With this kit, any size hole between 3 to 12 in. in dia can be quickly and accurately inspected for size, taper, and out-of-roundness.

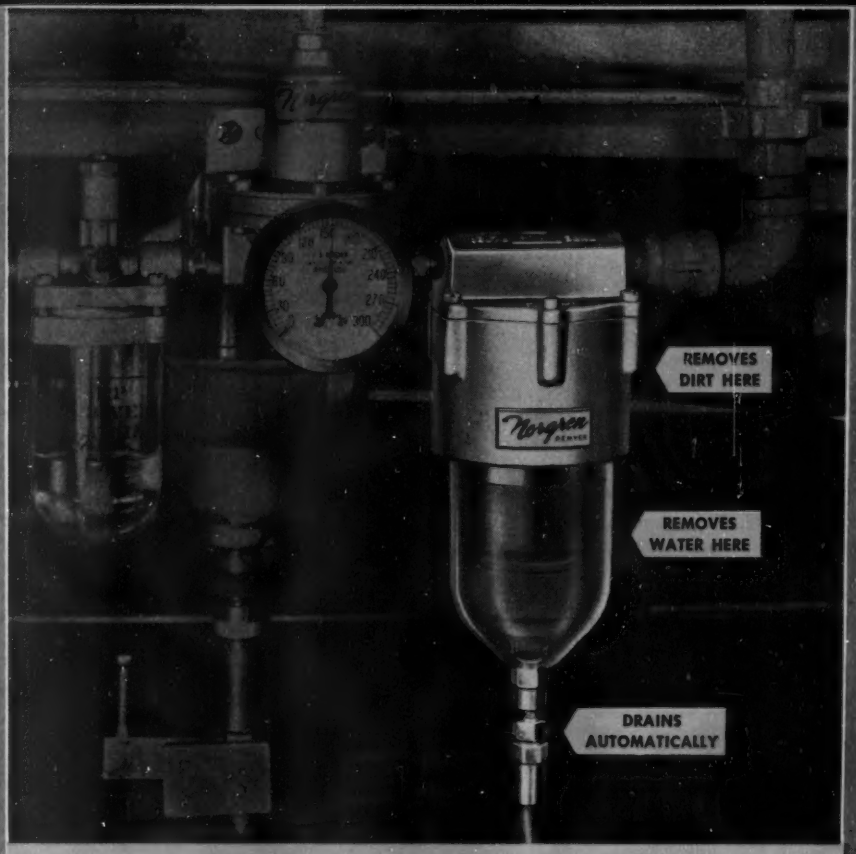
Gage consists of a triangularly-shaped spindle body to which are mounted a Plunjet gaging cartridge, and these interchangeable components: centering foot, handle connector, length extensions, and adjustment screw. All contact surfaces are of tungsten carbide. Cartridge, connected to a column Precisionaire, provides 1000 to 1 amplification.

Lightweight gage does not require master setting rings, as it is set to diameter being gaged with gage blocks and a 0 to 12-in. calibrator. It is self-centering and needs only to be rocked to ascertain true diameter of the bore.

*The Sheffield Corp, Dayton 1, Ohio*

# PROVED PROTECTION FOR AIR EQUIPMENT

## with NORGREN AUTOMATIC-DRAIN FILTER




The new Norgren Automatic-Drain Filter operates automatically, whether air pressure is constant or fluctuating, whether or not air is flowing...assuring clean, dry air, without attention.

Performance data prove its efficiency—***100% water removal*** up to flow of 20 cfm, 90% at flow of 30 cfm...at 80 psi primary pressure and flow of 35 cfm ***pressure drop across filter is only 1 psi.***

**WRITE FOR NEW CATALOG NO. 600**

New transparent replaceable bowl filter for ⅜" and 1" air lines. Water capacity 1 pint.

Replaceable metal bowl filter for ¼", ⅜" and ½" air lines.

Permanent metal bowl filter types for ¼" to 1½" air lines.

New, small replaceable bowl filter for ¼" and ⅜" air lines. Screw type clamp ring.

C. A. Norgren CO.
3436 So. Elati, Englewood, Colo.

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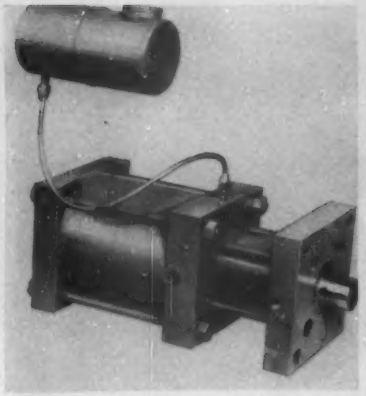
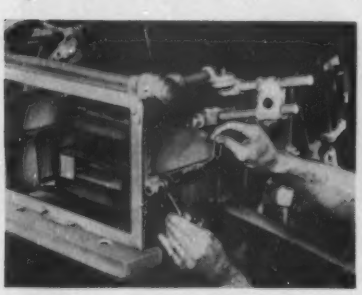


## Air Power Head Mounts Vertically or Horizontally

Model D 50 air power head has a 1-in. stroke, attains 5-ton pressure, and is designed for such general production operations as pressing, staking, and riveting.

Unit, which can be mounted at various positions, operates on air pressures up to 150 lb with a ratio of 100 to 1. Over-all size is 6½ x 6½ x 16 in. long; weight is approximately 100 lb. Ram is 1½ in. in diameter, and adapted to mounting tooling, punches, etc. Model can also be furnished in varying sizes and capacities.

*Air-Hydraulics, Inc, 202 Belden Rd, Jackson, Mich*



## Punch Press Safety Device

Air-Controlled di.: enclosure has been introduced for punch presses limited to primary operations.

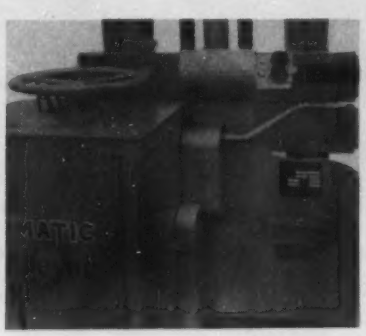
Transparent window is quickly opened to allow die changes or to adjust stock. While window is open, press cannot be tripped. Opening automatically cuts off air supply to the foot pedal valve and clutch cylinder by action of cam-operated volve. Adjustable finger side shields can be set to envelop stock and die clamps, leaving no opening for fingers to enter die. Adjustment of side shield can be made.

*American Allsafe Co, 1240 Niagara St, Buffalo, NY*

## Radial Play Gage

Special constant-load gage to measure assembled roller and ball bearings for radial play between outer and inner races is announced by Federal. Dead-load pressure is used to give constant pressure on races. Air is used to relieve weight pressure while inserting bearing. Fully adjustable to measure three sizes of assembled bearings ranging from 1 to 5-in. outer-race OD, gage can be modified to check any bearing size within that range. Two readings are taken—one under down pressure, one under up pressure—and subtracted.

*Federal Products Corp, 1144 Eddy St, Providence 1, RI*

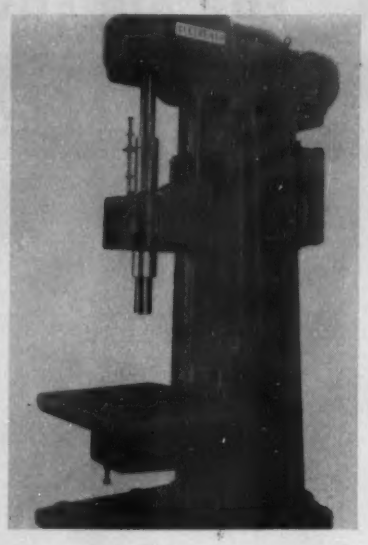


## Single-Hand Control Group For Transveyor Trucks

Transveyor fork lift trucks are now equipped with one-hand grouping of controls incorporating a rotary speed controller.

Replacing a foot pedal, the rotary handle provides three speeds in each direction, forward and reverse. Automatic return to neutral permits inching in both directions. Two pushbuttons grouped within finger-span operate the lift mechanism and horn. New design enables driver at all times to face in the direction in which truck is moving; all power is cut off when hand is removed from the controller.

*Automatic Transportation Co, 149 W 87th St, Chicago 20*



## Automatic Drilling And Tapping Machine Built To JIC Standards

Two completely automatic electromechanical drilling and tapping machines pushbutton operated, said to be completely adaptable for automation. Series AD machines drill, and Series ADT do tapping operations. Despite high degree of automaticity, machines are also said to be widely applicable to work on smaller lots than this kind of equipment can normally handle.

Both models have automatic cycle controlled by dogs. One set of dogs (with micrometer depth control) runs feed cycle, while another set controls rapid-traverse approach and return. Wiring is arranged so footswitch or auxiliary pushbuttons can be mounted wherever convenient.

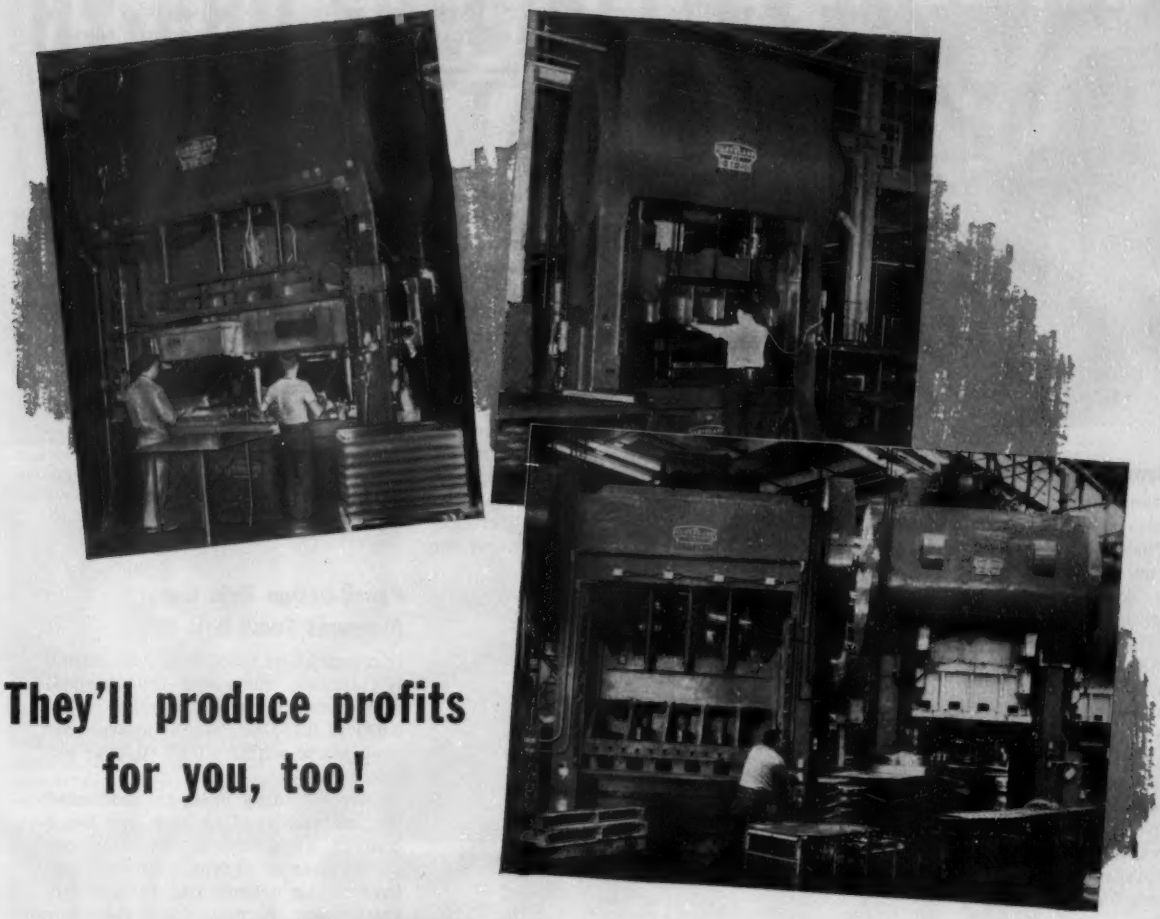
Model AD cycle is: rapid approach, feed, rapid traverse return. Model ADT has: rapid approach, tap in, tap out, and rapid return. Speed range is approx 60 to 1725 rpm, with feed range from approx 0.003 ipr to 0.250 ipr. Standard pitches of tap leads to ¼ pitch are available.

Normal equipment is 10-hp drive, with No. 5 Morse taper spindle, and various designs of flanged spindles can also be supplied.

Standard JIC controls and specifications have been strictly followed.

Single-spindle, gang-drill, and multiple-spindle models are available, and standard top section can be furnished separately for mounting on special-purpose machines.

*Cleereman Machine Tool Co, 640 W Washington Blvd, Chicago 6, Ill*



# They'll produce profits for you, too!

Pressed metal manufacturers in the Automotive, Aviation, Appliance and other related fields have found, from past experience, that Cleveland Presses are steady profit producers.

The rugged frames and extra long gibbing of their Cleveland Presses assure absolute slide alignment at all times. The positive, instantaneous control of the Cleveland (Patented) Drum Type Friction Clutch combines with dependable slide accuracy to give them the precise control so necessary for complicated stampings . . . the fast action to handle quantity runs.

The wide size range of all 11 types of Cleveland Presses makes it easy to select the exact Cleveland for top efficiency on any stamping job. This means extra profits for you.

A Cleveland engineer will gladly help you choose the right Cleveland for profitable press production. Write or call today! AA-383

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES — FABRICATING TOOLS

E. 40th & St. Clair Avenue, Cleveland 14, Ohio

*Offices at:* NEW YORK • CHICAGO • DETROIT
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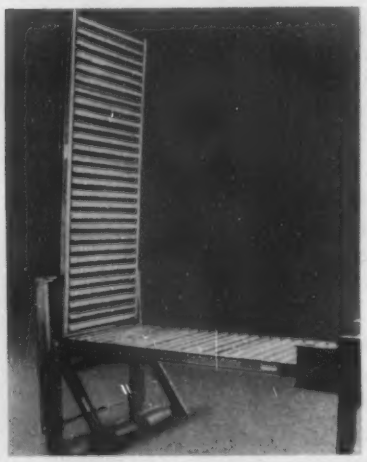
CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT

## Hand Milling Bench Machine

Standard fixtures such as centers and vises may be mounted on 4x22-in. T-slotted table with 8 in. longitudinal travel. Unit will accommodate 6½ in. of vertical motion. Traversing motion is 4 in. long.

Eight spindle speeds from 700 to 4500 rpm or optional extra speeds are available. Spindle has two preloaded double-row angular-contact bearings, drawbar, and No. 7 Brown & Sharpe taper. Power is from 1/3-hp GE rubber-mounted motor. Two models; No. 422 PM for production, or No. 422 TR for tool room, are available.

*Viking Industries, PO Box 22, Rockford, Ill*



## Air-Operated Conveyor Gate Raises, Lowers by Pushbutton

Counter-balanced air-operated gate for use across aisles has been added to Sage Equipment's complete line of conveyor.

Simple pushbutton arrangement on either side of gate permits operator to actuate raising and closing from either side. Fork-lift truck drivers do not have to get off machines to operate the device

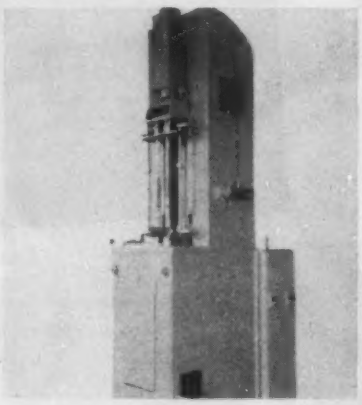
*Sage Equipment Co, 30 Essex St, Buffalo 13, NY*

## Small Bench Center

Bench center design for inspecting miniature parts, Type YBC-1, measures 9x5⅞x1⅛ in. Base is ground on all sides permitting wide variety of setups and checking on all planes. Center may be used with surface plate or sine table by unscrewing removable legs.

Unit is designed for fast, simple operation. Features stated by the manufacturer include: one-hand adjustment of live center post; removable live and dead centers; replaceable spring; and easily regulated sliding fit of live center. All critical wear surfaces may be reground for wear correction.

*Transit Coil Corp, 107 Grand St, New York, NY*



## Acme Internal Broaching Machine Is Vertical, Pull-Down Model

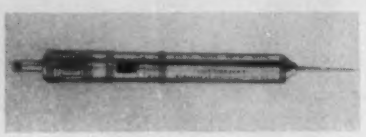
Machine, recently announced by Acme, is available in various capacities from 6 to 30 ton, and from 36-in. to 60-in. stroke.

Broach pull slide is guided by hardened and ground box-design ways throughout entire stroke; upper broach retriever slide is similarly guided for precision alignment of tools at all times throughout machine cycle. Both the upper retriever cylinder and the main cutting cylinder strokes are adjustable for various lengths of broaches. Since entire upper retriever slide and cylinder assembly may be moved downward between guide bars, and relocated, an extremely wide length range of tools may be used.

Travel speeds of both cylinders are variable by means of speed control valves, and each cylinder has its own self-contained hydraulic circuit. Automatic lubrication to slides is provided, and drive motor, pumps, and hydraulic components are in dry, ventilated, readily-accessible compartments.

Machine illustrated is arranged to broach round bore and a single keyway in four die castings at a time, producing approximately 520 finished pieces per hour. Unit has been designed so that it may readily be tied in with automatic feed and discharge, or for use in automated-line production.

*Acme Broach Corp, Milan, Mich*



## Pencil-Design Hole Gage Measures Small-Hole ID's

Direct-reading hole gage, called Kwik-Chek, measures the internal diameters of holes ranging from 0.020 to 0.130 in., and is guaranteed accurate to within 0.0005 in. over entire range.

Direct-reading scale is graduated in thousandths of an inch and has a built-in 2½X crystal magnifier enabling user to obtain accurate readings to the nearest half-thousandth. Instrument, furnished in a leather case which also contains a machined steel setting gage, is priced at $37.50.

*New Standard Div, US Expansion Bolt Co, York, Pa*

## Go, No-Go Gages Have Adjustable Jaws

Total range from 0.708 to 2.835 in. is possible with six adjustable go, no-go gages. Ardec gages can be set with micrometer, indicator, or Johansson blocks. Each gage has long jaws similar to solid plug gages to permit straight entering. After gage is set it can be locked and wax-sealed to prevent tampering.

*Ardec, Inc, Media, Pa*

# HY-PRO SPECIALIZES IN EVERY PHASE OF TAP PRODUCTION!

## ...to save *you* time and money

**TAP PROBLEM?** You'll be safer to call on Hy-Pro. They specialize in solving all tap needs.

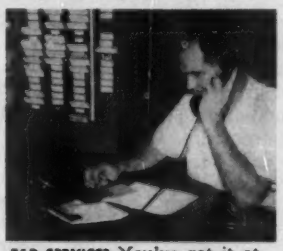
**DESIGNS** are made to suit your specific demands by designers who specialize in taps.

**TAP MATERIALS** are the finest high speed steel, specially heat-treated to give you lower costs per tapped hole.

**ACCURACY** in every tap is checked individually to guarantee that the tap will do its job and to maximize its money saving life for you.

**HOME OF HY-PRO** is this six-acre plant in New Bedford. Here every phase of tap manufacture is done under the careful supervision of specialized production men.

**SHIPMENTS** are speeded on their way by specialists who know the quickest and safest routes to you and your distributor.



**TAP SERVICE?** You've got it at Hy-Pro. We specialize in every phase of tap production . . to save *you* time and money.

REG. U.S. PAT. OFF.

**HY-PRO**

**HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.**

DISTRIBUTORS IN ALL LEADING CITIES

**ADDITIONAL WAREHOUSES:**

| 6046 COLLEGE AVE. | 10428 W. McNICHOLS RD. | 6141 NORTH ELSTON AVE. | 109 EDISON PL. |
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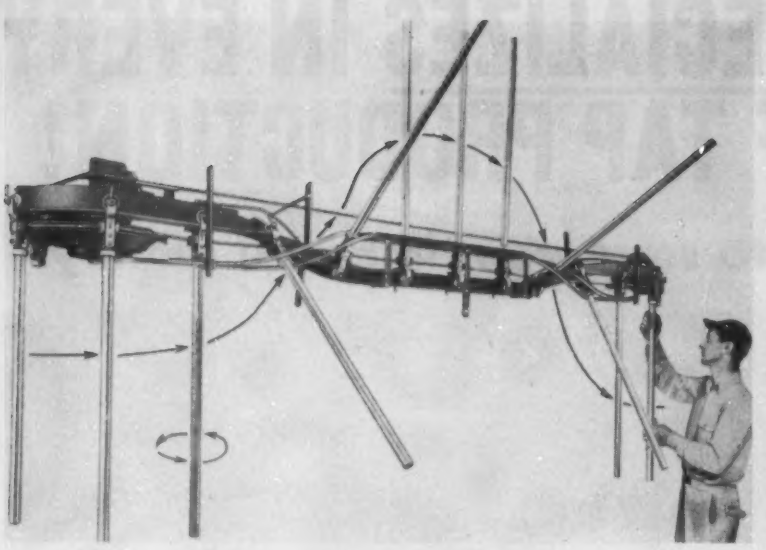
| PIEDMONT 5-4337 | UNIVERSITY 4-1077 | NEWCASTLE 1-6486 | MARKET 2-4318 |



# Cable Conveyor Unit For Dipping Operations

The DipAid unit is for use in Bush-Lock cable conveyor systems handling parts through dipping operations. Positioned in system immediately following dip tank, unit imparts variety of motions to product to aid in securing more even distribution of finish. It is for use where parts are dipped into paint, plastic, liquid latex, lead, zinc, or other organic or inorganic finishes, consists of two spiral 180° twists in the trolley rail, plus accessory buffer strips and side guide rails.

In application, product emerging from dip tank is swung counterclockwise to 180° and in return to normal position by spiral twists in rail. Simultaneously a horizontally-mounted wheel engages side rail to make product rotate along own axis. Spiral motion along axis of conveyor is made possible by Bush-Lock design which permits rotary floating action of trolley around cable.

Unit was designed for use on any ¼ or ⅜-in. Bush-Lock cable conveyor and in addition special hooks can be supplied with rigid connection to product.

*The E W Bushman Co, 4364 Clifton Ave, Cincinnati 32, Ohio*

### Self-Locking Nuts

Jacobson self-locking machine screw nuts eliminate lock washers and their cost of assembly. Stop-nuts are double-chamfered and countersunk and may be assembled either side up for automatic hopper assembly. Said to maintain locking action after repeated use and will lock in any position on the thread. Available in steel, brass, and aluminum, in all machine screw sizes.

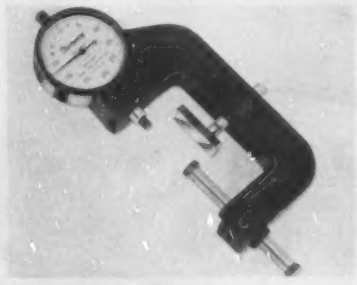
*Jacobson Manufacturing Co, Kenilworth 9, NJ*

### Indelible Marker

Col-R-Coder for indelible marking of paper, fiber, and plastic tags, applies a broad stripe of ink to one or several tags at once in any of twelve different colors. Said to be able to survive water, steam, solvents, bleaches, alkalies, digesters, and most other solutions and temperatures. Set consists of aluminum marking device, glass and rubber dropper, and bottle of ink.

*Dri-Flo, 642 E Ten-Mile Road, Hazel Park, Mich*

SHEFFIELD production gaging instrument inspects four dimensions simultaneously on carrier body of automatic transmission. In one operation, unskilled operator checks seat chamfer on inside of body, outside body diameter, over-all body length and dimensions from top of shank to bottom edge of upper flange. Dimensional quality of part is indicated by master Light and four individual signal lights. Instrument is equipped with three new small Electrichek gage heads for checking outside dimensions. Airlectric gage head checks internal seat chamfer, transferring variations in air flow to electric circuit. It is set up with maximum and minimum masters — *The Sheffield Corp, Dayton 1, Ohio*



### Geneva Snap Gage Has Large Back Stop

Geneva dial snap gage has large flat surface backstop which permits instant positioning of work piece—rigid backstop can be set in position and locked firmly. Allen setscrew locks backstop stud and is flush with frame. The ½-in. cast iron frame offers maximum protection. Design allows full travel of indicator and is balanced unit with compensation for weight of gage and hand.

Standard threading in indicator and lower anvil permits replacement with standard indicator points and pointed contacts can be supplied for checking necks and grooves. Lower anvil is movable and set and locked firmly with Allen setscrew.

*Chicago Dial Indicator Co, Dept D, 180 N Wacker Dr, Chicago, Ill*

### Vibration Plotter

Resonant vibration plotter aids analysis of mechanical damping factors in rotating machinery. It automatically plots vibration amplitude as function of frequency or speed. Unit incorporates scale expansion and has accuracy of frequency measurement within 0.1%.

*Franklin Electronics Inc, 415 West Pike St, Philadelphia 40, Pa*

QUALITY CONTROL CHECK AT FACTORY. READING OF "ONE-TENTH" INDICATOR READS O ALONG 6" OF THE PARALLEL. NOTE ADJUSTABLE STOP (*See Inset*).

# New J & S Precision Grinding Vise square within 0.0001" or less in 1" in 4 positions

**Hardened, Ground and Lapped—Deep Frozen for Stabilization—Holds Tapered Diameters and Odd-shaped Workpieces**

*For inspection, grinding, milling, drilling and tapping, jig boring, layout work . . .*

This new J & S "Square-perFect" Vise is one of the most practical precision vises ever developed. Its many helpful features explain why:

It is square, for example, with 0.0001" or less in 1" in 4 positions. It is attachable to J & S 5" sine bar with 0.100" recess for small angles.

**Accurate, Adjustable Stop**

Like all J & S workholding tools, it has a unique downholding clamping action. This assures dependable, accurate positioning of workpieces. An adjustable stop provides fast, *sure* positions for repeat operations. Workpieces can be loaded and unloaded rapidly.

**Holds Tapered, Odd-shaped Workpieces**

The clamping jaw of this J & S Precision Grinding Vise swivels to permit holding of tapered and odd-shaped workpieces. It holds round stock from 1/16" to 2½" in diameter in Vee-block fashion. The range of jaw openings is from 0" to 3".

Get all the facts without delay. Fill-in the coupon and mail it today.

J & S TOOL CO., INC.,
W. Mt. Pleasant Avenue, Livingston, N. J.

Please send me complete information on your J & S Precision Grinding Vise.

NAME.....

COMPANY.....

STREET.....

CITY.....STATE.....

J&S TOOL CO., INC.

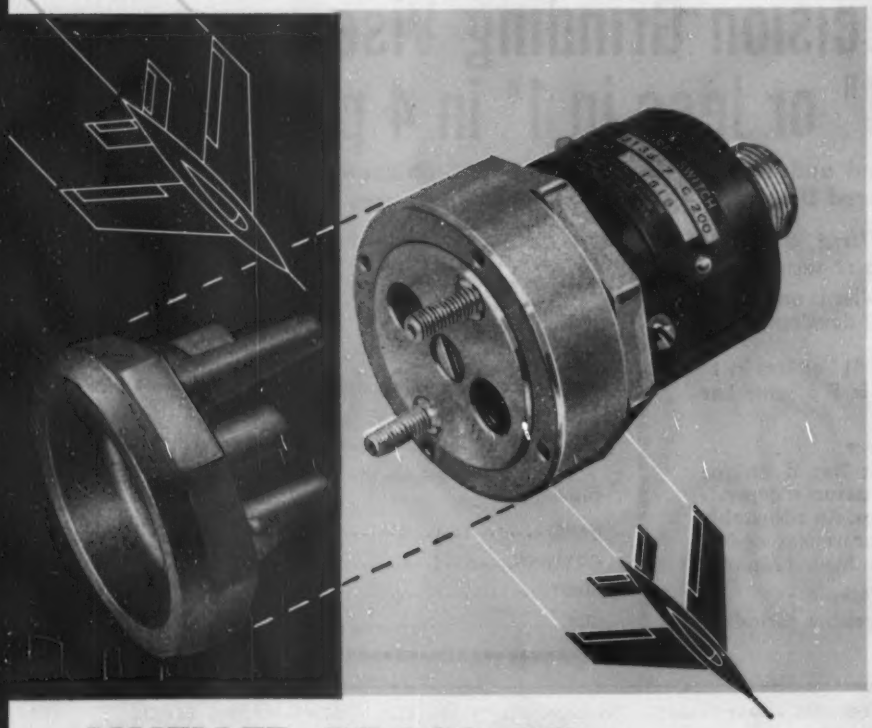
WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

646 W. Mt. Pleasant Ave., Livingston, New Jersey

## MUELLER BRASS CO. forgings help insure dependable operation of aircraft pressure warning instruments

A specially designed housing, accurately forged to customer specifications by Mueller Brass Co., seals in the diaphragm of the pressure warning unit manufactured by Eclipse-Pioneer Division of Bendix Aviation Corporation in Teterboro, New Jersey. The unit, designed for installation in fuel, oil, water or alcohol lines of modern aircraft is a highly sensitive instrument that instantly warns the pilot or flight engineer of any unusually high or low fluid pressures.

All Mueller Brass Co. forgings have a dense, close-grained structure with a high tensile strength. Weight savings up to 40% are possible in the design of parts because of the close tolerances to which they can be produced. Less scrap and longer tool life result from the easy machinability of forged parts. Mueller Brass Co. is completely equipped to design parts for your products, specify alloys (including special alloys developed by our metallurgists), forge, machine, finish and plate the parts and perform all necessary assembly operations. Write today for our free illustrated 32-page forgings catalog and complete information about MBCo forged parts for your products.



**MUELLER BRASS CO.**

PORT HURON 23, MICHIGAN


**Filter elements** designed for airborne high-temperature hydraulic oil services are made of porous type 316 stainless, and may be used at temperatures in excess of 600 F. Elements remove 2, 3, 7, 12, or 22 micron size particles as desired. Available in sizes rated to handle 0.5 gpm, 3 gpm, 6 gpm, and 12 gpm of oil.

*Aircraft Porous Media, Inc, Glen Cove, NY*

**Air control valve,** designated Lifeguard, "senses" valve malfunctioning and shuts itself off when any component does not operate normally. AC solenoid, pilot-operated, three-way model operates up to 600 cycles per minute. Main valve pressures range from 30 to 125 psig air, with pilot pressure of 40 to 125 psig air. Max temperature is 175 F; weight is 14 lb, and inlet pipe size ¾ in.

*Ross Operating Valve Co, Dept 1900, 6489 Epworth Blvd, Detroit*

**Automatic conveyor lubricator** injects either grease or oil. Model 702 lubricates one side only; Model 704 lubricates both sides of a mono-rail conveyor. Units automatically apply a controlled volume to the wheel bearings of the trolleys. Handles a wide range from light oil to heavy fiber greases.

*J N Fauver Co, 51 W Hancock, Detroit 1*

**Tap grinder,** Model 1300, is especially designed for sharpening tap chamfers. Capacities are from No. 0 machine screw taps to 1½-in. hand taps; ⅛-in. to 1-in. pipe taps; RH or LH threads with various numbers of flutes, according to accessories selected.

*Henry P Boggis & Co, 706 E 163rd St, Cleveland 10*

**Air gun safety device,** named Saf-T-Blo, is an attachment which can be fitted to any gun for cleaning out blind drilled holes efficiently. It directs exhaust air blast in a controlled path, preventing ejected chips from flying into user's eyes.

*Saf-T-Blo, 196 S Kingsway Rd, Toronto 3, Canada*

**Magnetic sweeper,** called Memco Ferrosweeper, is permanently energized and needs no electric current to operate. Lightweight unit can be pushed, pulled, suspended from a lift truck, or hauled behind a vehicle. Available in five sizes with a choice of four magnetic strengths.

*Magnetic Engineering & Mfg Co, Clifton, NJ*

# WICKES CENTER DRIVE CRANKSHAFT LATHES

## with automatic feeder-unloader now rough and finish machine 20 forged steel V-8 automotive crankshafts an hour on continuous operating cycle

With the new hydraulically operated loader and unloader, Wickes Center Drive Crankshaft Lathes are now machining up to 20 forged steel V-8 crankshafts an hour on a completely automatic work cycle for several of America's largest automobile manufacturers. Here's how the machine operates: Automatic loader picks up milled crankshaft from the loading rack and loads it into center drive position, at the same time it is picking machined crank from the lathe and depositing it on unloading rack. Automatic chuck, synchronized with the loader, closes over the chankshaft as centers move into position. Lathe performs rough and finish cheeking, turning and filleting operations on all main line bearings and finish turns both flange and stub ends. This complete cycle automatically continues to repeat, until transferred to non-repeat by operator.

Wickes manufactures both main line bearing and multiple crank pin turning lathes for all types and sizes of crankshafts. Whether you're machining cast or forged crankshafts or using Tangtung or carbide cutting tools, Wickes has a lathe to fit your production.

**Submit** your crankshaft turning problems for detailed information.

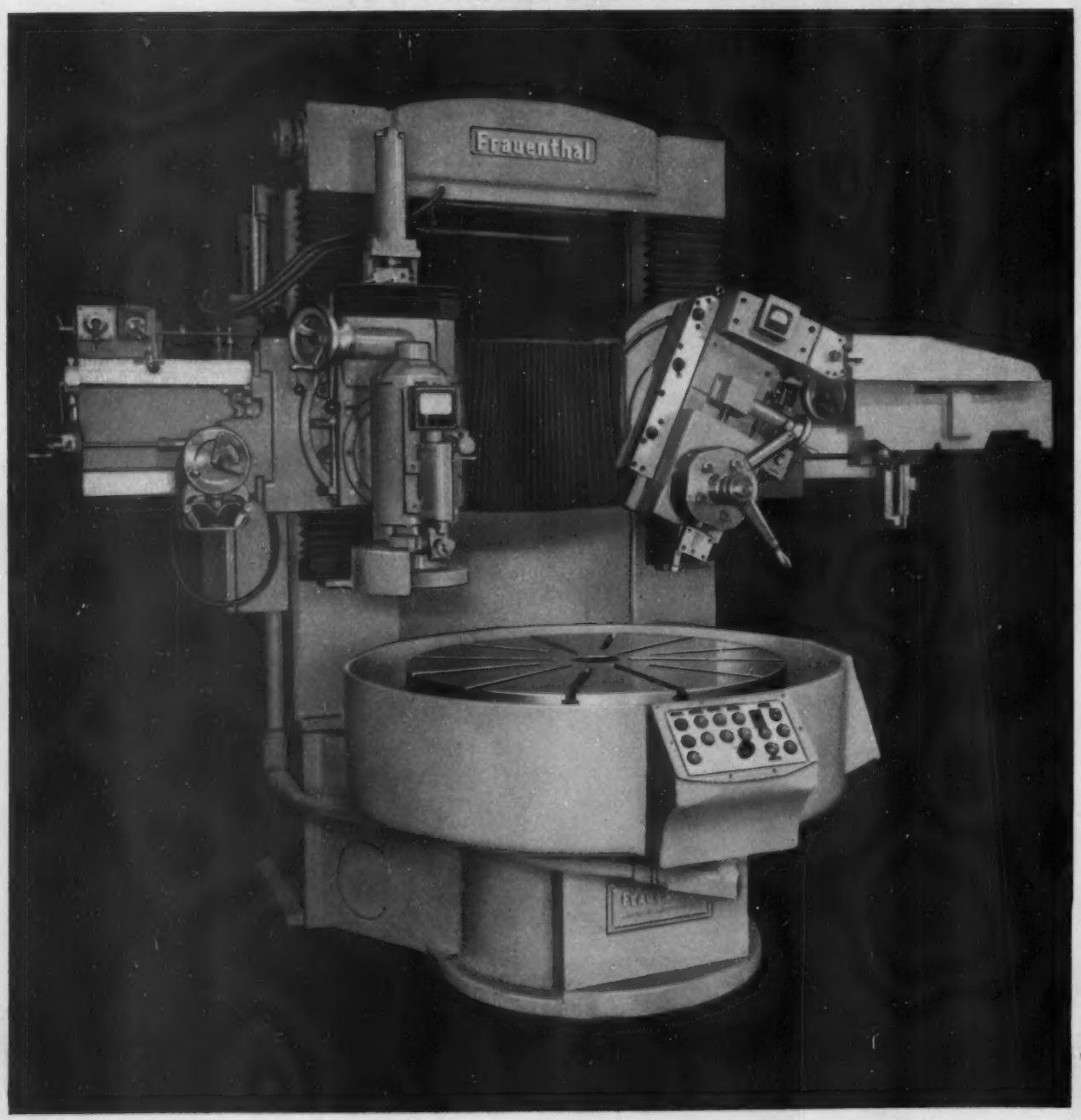
# WICKES

100 YEARS' EXPERIENCE IN SOLVING PRODUCTION PROBLEMS 84

**BROTHERS • SAGINAW, MICHIGAN**

DIVISION OF THE WICKES CORPORATION

# CAN YOU
## to. 000200" accuracy



# turn, bore and grind in a single set-up?

## The Frauenthal 3100 Series offers this precision and versatility with these cost-cutting features

***1. Utmost versatility*** — Both grinding compound and turret slide can be swiveled to meet practically any angular requirement.

***2. Super-precision performance*** — Only a Frauenthal grinds related surfaces to accuracies within .000200", producing consistently uniform precision in concentricity, parallelism and roundness.

***3. Horizontal table*** — Loads easier and faster than vertical face plates. Horizontal table also provides greater stability for large, heavy parts.

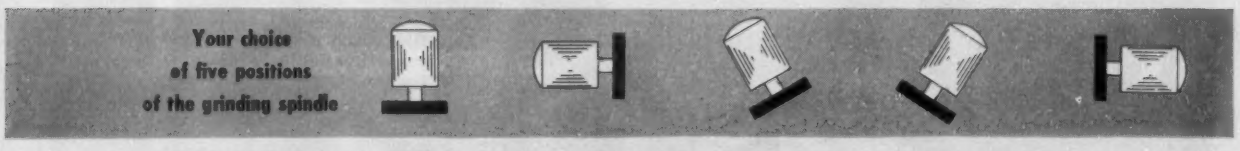
***4. Simplified tooling*** — Horizontal table permits simpler fixtures, particularly for thin-section jet engine parts, plus economy of dual purpose tooling for turning and grinding.

***5. Convenient controls*** — All operating controls are easily within the operator's reach for quick selection of feeds and speeds. Electrical interlocks are provided for utmost safety.

***6. Contour turning*** — Hydraulic duplicator attachment (turning head) performs tracer controlled turning operations most accurately and performs repetitive operations at lower cost.

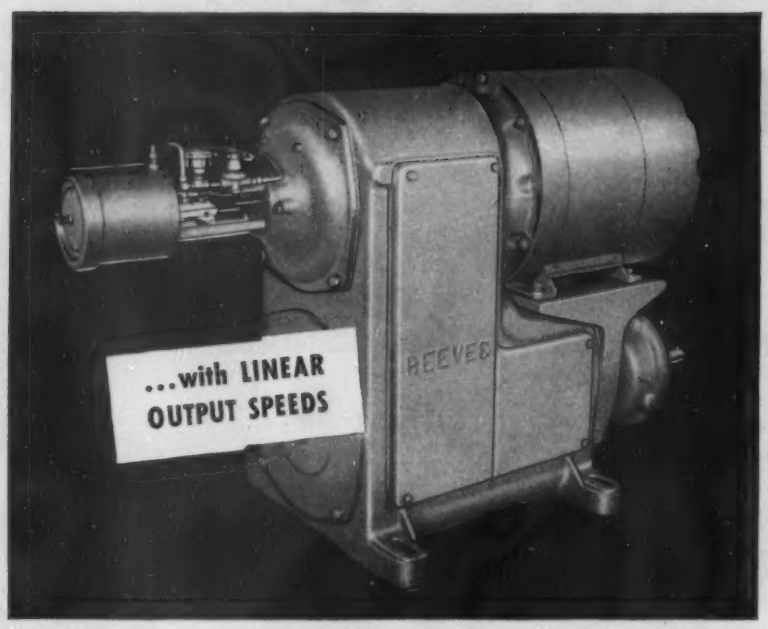
***May we help you?***

If you'd like further information on how the 3100 Series precision turning and grinding machine can give you production and/or tool room advantages — our engineers are at your service. Write for informative bulletin No. 301.




**Frauenthal Division · KAYDON ENGINEERING CORP. · Muskegon, Michigan**

# New *Automatic Speed* Control for Continuous Processing




# REEVES

## Auto-Pneumatic Control

●Now with the REEVES Vari-Speed Motodrive equipped with the new sensitive Auto-Pneumatic control, you can automatically control continuous processes involving the regulation of heat, liquid level, pressure, temperature, flow, and many other variables. Positive, direct connection from the pneumatic instrument to the Auto-Pneumatic control assures accurate and sensitive speed regulation.

Exclusive REEVES cam design provides linear output speeds so necessary for delicate proportioning processes . . . maintains the greatest accuracy while regulating or maintaining any speed throughout the range of the Motodrive.

REEVES Auto-Pneumatic Control assures maximum efficiency and economy in industrial processes . . . means outstanding savings for you in material, fuel and labor costs plus continuous uniformity of your product or process. Write today for complete information.

**REEVES PULLEY COMPANY • COLUMBUS, INDIANA**

*Send today for*
BULLETIN A13a-M542

**Purifier** for keeping moisture and dirt out of air tools and other pneumatic equipment is said to require no maintenance. Type LC Hi-eF unit operates by means of a combination centrifugal and baffle design separating element inside a forged steel body. Available in a wide range of sizes for installation in any size piping when used in a vertical position, and made in 1-in. through 2-in. sizes for horizontal.

*The V D Anderson Co, 1935 W 96th St, Cleveland 2*

**Electrode,** called Phos-Bronze, welds brass, bronze, copper, cast iron, and steel in all positions. Protective coating on rod causes metal to pass through the arc steadily in same manner as do conventional shielded arc electrodes; said to provide a softer stable arc and lower spatter. Can be used with direct current—reverse polarity; works best under low amperage and high voltage.

*Pacific Welding Alloys Mfg Co, 310 North Ave 21, Los Angeles 31*

**Meletron pressure switch,** Model 532, senses a difference between two variable pressures, or a variable and a reference pressure. Available in 4 classes of proof pressures from 500 to 12,000 psi. Unit permits opening or closing of a circuit on increasing or decreasing pressure difference from 15 to 10,000 psi at any point within adjustable range of model selected.

*Barksdale Valves, 5125 Alcoa Ave, Los Angeles 58*

**Hydraulic check valve,** 3000 psi, allows free flow in one direction and prevents flow in opposite. May be secured with pipe thread or flange connection; available in ¼ to 1½-in. sizes; mounting may be made in any position. Model 8640 is spring closed; 8642 is pilot operated, and 8644 is pilot-operated with pressure breaker.

*Rivett Lathe & Grinder, Inc, Brighton 35, Boston, Mass*

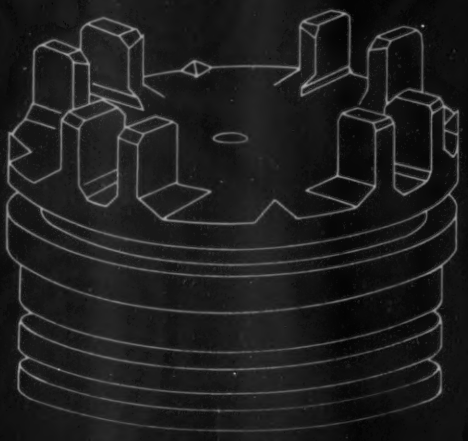
**Tote boxes** have been designed with four steel lugs riveted to the tapered, vulcanized fiber sides, permitting the lightweight boxes to nest without jamming.

*William Bal Corp, 2A Johnson St, Newark 5, NJ*

**Hatchet soldering iron,** weighing 3 oz, is available in 25 w with ⅛-in. tip (No. 25H) or 30 w with 3/16-in. tip (No. 26H). Operates on ac or dc, any cycle; available in 110 or 220 v; price, $5.50.

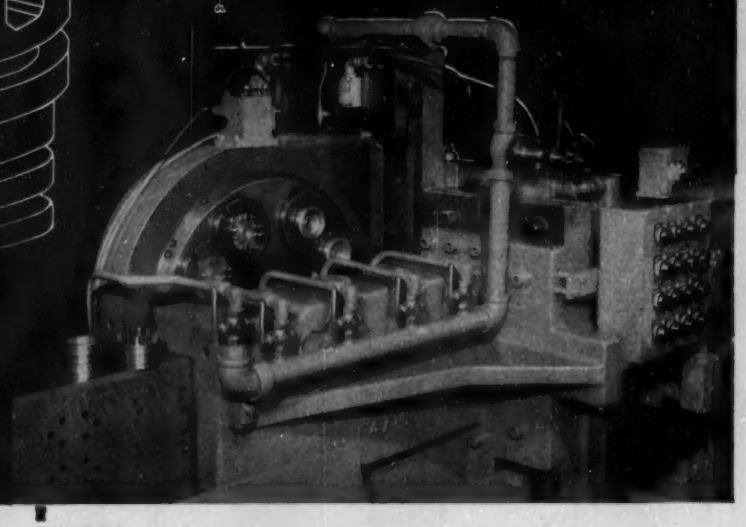
*Hexacon Electric Co, 135 W Clay Ave, Roselle Park, NJ*

# truly phenomenal production!



NOZZLE PART

425



HP 40 HORIZONTAL 90" STROKE

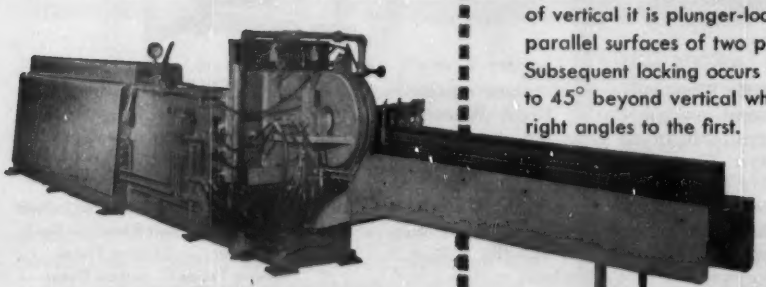
**Hydraulic**

**BROACHING MACHINE**

## automatic operations!

Clamping and unclamping of parts, advance into broaching position, retraction for the return, and rotation into successive locked positions are all automatic . . . with full electrical interlock . . . so the operator's chief duty is to unload and reload parts!

**The efficient LAPOINTE-built fixture** has a rotor mounted on a horizontal axis with 4 pairs of part nests spaced 90° apart. Parts are loaded in pairs. As the rotor turns into position 45° ahead of vertical it is plunger-locked for the initial cut, broaching the parallel surfaces of two pairs of trunnions in a single pass. Subsequent locking occurs when the rotor has automatically indexed to 45° beyond vertical where the second broaching cut is made at right angles to the first.



*Complete specifications are given in Bulletin* **HP-2**

FORWARD!

by

**LUBRIPLATE LUBRICANTS**

The introduction of LUBRIPLATE Lubricants established a new high standard for industrial lubrication. Now, a recently patented improvement in the production of LUBRIPLATE results in even greater lubrication efficiency. Under today's operating costs, reduction of down time, less parts wear and replacements, as well as lower power consumption, far outweigh any differential in the initial cost of LUBRIPLATE Lubricants.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for your free copy of the new and enlarged LUBRIPLATE DATA BOOK—a most valuable treatise on modern lubrication!

**LUBRIPLATE DIVISION**
Fiske Brothers Refining Co.
Newark 5, N. J. • Toledo 5, Ohio

**Fork lift trucks** are available with built-in centralized lubrication. With a Multi-Luber, manufactured by Lincoln Engrg Co, operator lubricates all vital steer-axle bearings simultaneously with a stroke of the control lever. Lubricant reservoir has sufficient capacity for approximately 120 cycles of the system.

*Automatic Transportation Co, 149 W 87th St, Chicago 20*

**Circular slide rule,** 8-in. dia, laminated plastic, is equivalent to a straight rule over 20 in. in length. Performs multiplication, division, proportions, finding squares or square roots, cubes or cube roots, reciprocals, and logarithms. Complete instructions printed on reverse side; price, $3.

*Allegheny Plastics, Inc, 2 Thorn Run Rd, Coraopolis, Pa*

**Medium-duty welding torch,** Torchweld 45, welds steel from 28 gage to ½ in. thick. Weight is 11 oz, including mixer. Two series of swaged tips, one-piece and screw-in style, are available in 12 sizes. Special attachment converts it into a cutting torch with capacity for cutting steels ⅛ to 1½ in. thick.

*National Cylinder Gas Co, 840 N Michigan Ave, Chicago 11*

**Volatile corrosion inhibitor,** VPI-250, can be applied with a squeeze bottle, a salt shaker, or any similar device, or the white powder may be dissolved in alcohol and applied in solution. Does not have to be applied directly to surface; if powder is dropped into an enclosed space, vapors will penetrate even hard-to-reach areas and condense on all surfaces.

*Shell Oil Co, 50 W 50th St, New York 20*

**Jiffy Tires** are now standard equipment on all Carter Rigid Wheels, available in all sizes for any bandsaw. Tires, in sizes from 14 to 36 in., are quickly and easily applied without glue, cement, or special tools; are held on by compression and by a special locking rib which fits into a keyway in face of wheel.

*Carter Products Co, Dept W, 30 Ionia Ave, SW, Grand Rapids 4, Mich*

**Self-cleaning switch** for use in test equipment is a 12-position, continuous rotation, detent-action type with phosphor bronze wiper contacts. Extremely low internal resistance permits use in the most precise equipment.

*Industrial Instruments, Inc, 89 Commerce Road, Cedar Grove, NJ*

For LAYOUT, INSPECTION, CHECKING, LAPPING, ASSEMBLY AND WELDING

CHALLENGE Semi-Steel LAYOUT SURFACE PLATES

*High* compressive strength · · · *Low* coefficient of expansion. 16 standard sizes, 6" thick - other sizes to order. Also available for sectional assembly into unlimited sizes. Precision ground or planer finished.

CHALLENGE WORK BENCHES

Four sizes. Cast iron top, 2-in. thick. Welded steel supports, tool box shelf, steel drawer with pilfer-proof lock.

Other Challenge products include Clamp Edge Layout Plates · · · Reading Tables · · · Lapping Plates · · · Welding Tables · · · Surface Plates · · · Bench Plates and Surface Plate Equipment. The entire line is pictured and described in Challenge's latest catalog. Send for free copy, today!

Challenge

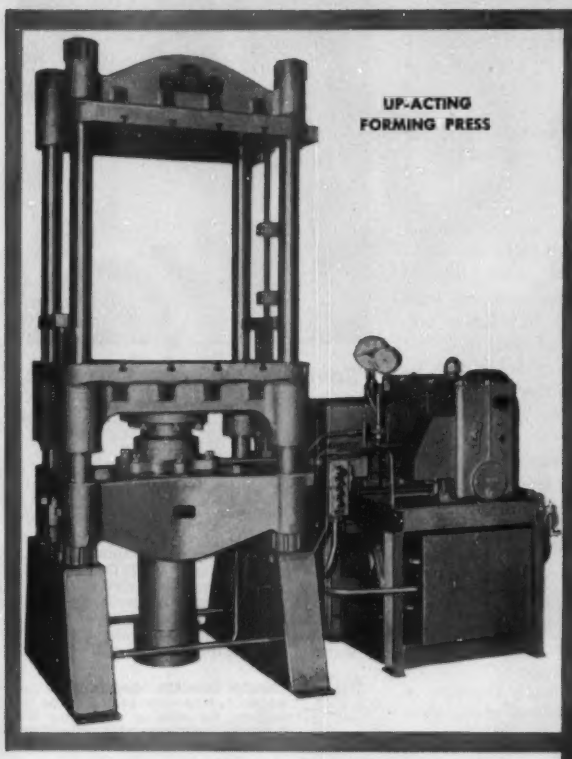
TRADE-MARK ® 769

**THE CHALLENGE MACHINERY CO.**
Office, Factories and Show Room:
Grand Haven, Mich.

# 2 BRAND NEW RODGERS PRESSES

*speed metal and plastic processing*

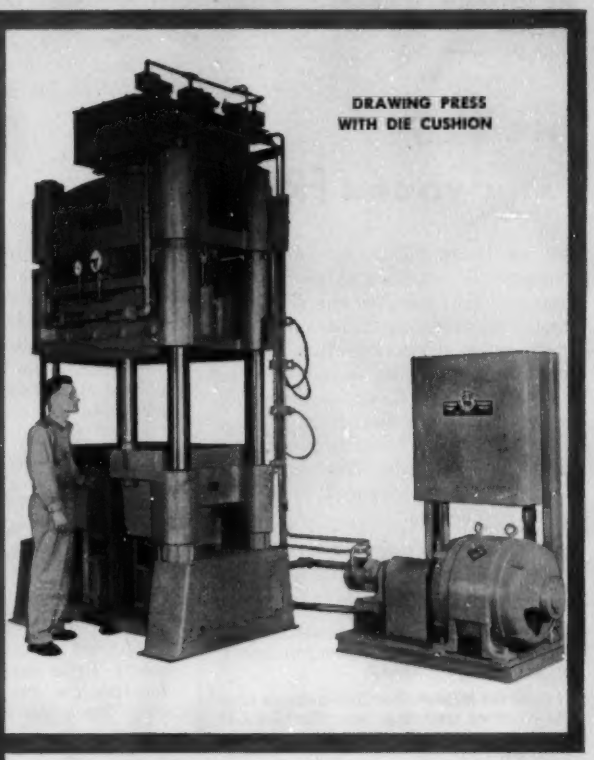
**TWO NEW** platen press models have just been added to the Blue Ribbon Line of industrial presses manufactured by Rodgers Hydraulic, Inc. The new presses—one an up-acting, the other down-acting—are available in a range of capacities and platen sizes. These new models, like all Rodgers Platen Presses, are designed to offer you greatest versatility and reliability at faster cycling rates. Investigate the application of these presses to your plastic and rubber molding, metal drawing and forming, veneering, and general assembly and utility applications.



UP-ACTING FORMING PRESS

This new Rodgers Hydraulic Up-acting Platen Press is designed to meet *all* requirements of your plastic, rubber or metal forming jobs.

This press has a 100-ton capacity and 30" x 30" platens —an adjustable ejector accessory unit speeds up the cycling rate. Other Rodgers accessory units adapt this press to your every need. Automatic electro-hydraulic control system governs platen pressure, movement and cycling on production runs of any length.



DRAWING PRESS WITH DIE CUSHION

New 400-ton, 48" x 36" drawing press is equipped with 70-ton die cushion, die mounting and bolster plate. Auxiliary cylinders provide fast lowering and retraction of platen—a big time saver!

The press uses the complete Rodgers electro-hydraulic system to control platen movement, platen pressure, and time cycles for short as well as long run production jobs. You'll increase quality and boost production rates of your metal drawn products by using this new Rodgers Hydraulic Drawing Press.

**IF YOU'RE PROCESSING METALS AND PLASTICS** you'll be interested in these presses; let us send you more information and also a copy of our catalog describing other Rodgers "Blue Ribbon Presses" for plastic and rubber molding, metal drawing and metal forming.

HYDRAULICS Rodgers KEEP THE WORLD MOVING

## Rodgers Hydraulic Inc.

7407 WALKER STREET, MINNEAPOLIS 16, MINN.

THE DIES
ARE YOURS FREE!

Yes, we do hundreds of stamping jobs without making special tools—and there's a good reason for this. In stamping out laminated shims for over forty years, we've developed much special equipment and tooling unknown in the average stampings house...including an arsenal of blanking dies and punches... and we've acquired unusual production techniques and skills. This equipment and these special skills are at your service without charge.

ROCK-BOTTOM PRICES • BY THREE METHODS!

*These three separate production techniques are judiciously applied to save you money on your stamping needs!*

**MACHINE CUT METHOD.** For half-a-dozen or a few hundred stampings, our *Machine Cut Method* produces the stampings at amazingly low cost.

**SHORT RUN METHOD.** As quantities increase, we shift to the *Short Run Method*, with stock tooling and temporary dies.

**PRODUCTION METHOD.** Or we shift to our *Production Method* using high speed self-feeding presses.

For full information, send for our free 12-page booklet "Service in Stampings." And next time you need stampings, let us bid—and discover the savings we offer.

STAMPINGS DIVISION
"ONE PIECE OR ONE MILLION"
LAMINATED SHIM COMPANY, INC.
3111 UNION STREET • GLENBROOK, CONN.


**BR hardfacing rod** has been developed specifically to withstand combination of extreme abrasion and very heavy impact. Worn parts originally rebuilt with the rod can be rebuilt over and over, with the new metal forming a permanent bond with previous deposit. Available for either electric or acetylene application.

*Mir-O-Col Alloy Co, 312 North Ave 21, Los Angeles 31*

**Stainless steel welding electrodes** are available in 15 popular types for use with either ac or dc. Line is said to give an extremely fast rate of deposit, reduce spatter loss to a minimum, create a very soft arc, and facilitate an exceptionally easy slag removal.

*Pacific Welding Alloy Mfg Co, 310 North Ave 21, Los Angeles 31*

**Heavy steel plate** is available from stock ranging from ½-in. thick measuring 200 by 100 in. to 15 in. measuring 140 by 80 in., with tensile strengths of different specifications ranging from 55,000 to 85,000 psi. Plate can be shipped full size or flame-cut within close tolerance to specified sizes and shapes.

*By-Products Steel Co, Coatesville, Pa*

**Bakelite C-8 epoxy resins** BR-18774 and BR-18795 combine with four hardeners specially synthesized for them to form strong, lightweight products said to have excellent chemical resistance and electrical properties. Resins cure to hard solids at low or room temperatures without applied pressure, and with extremely little shrinkage.

*Bakelite Co, Div, Union Carbide & Carbon Corp, 260 Madison Ave, New York 16*

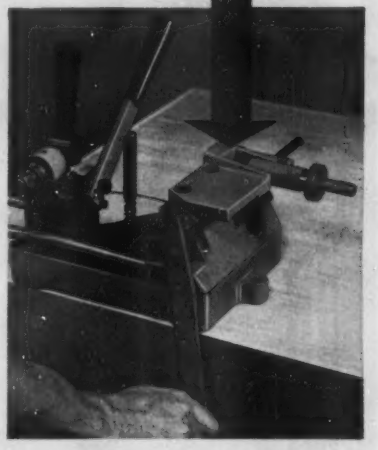
**Reel and stand** for steel coil handling feeds coil directly. Reel is built to any capacity, and heavy-duty stand has ball bearing raceway for holding. Adapters built to handle any diameter of coil.

*Palmer-Shile Co, 16019 Fullerton, Detroit 27*

**Arc welder,** P&H Model DA-200, provides both ac and dc welding in a single machine. Change from one current to another may be made while welding. AC service range is from 7 to 275 amp; DC from 7 to 200. Operates on 22/44-v, 50/60-c current, single phase. Equipped with Dial-lectric control which provides instantaneous heat selection. Details in Bulletin W-93.

*Harnischfeger Corp, Welding Div, 4605 West National Ave, Milwaukee, Wis*


make Springs in Seconds!



*Save Costly Special Orders With the NEW*

**DI-ACRO* Spring Winder**

This unique machine eliminates costly special spring orders, saves valuable waiting time. Winds flat, torsion, compression and extension springs to 1½" O.D. Handles round, flat and rectangular wire to ¼" dimension. Note exclusive features in the hand operated Di-Acro Spring Winder which assure accurate tension and fast operation without special experience or skill.

new **TENSION CONTROL**—Simply adjust to desired tension—the control keeps it uniform, for winding one spring or hundreds, and releases when each spring is wound.

new **WIRE CUT-OFF**—After spring is wound, release tension and use cut-off lever to quickly cut end of spring to desired length.

new **CAM LOCK**—Simply feed wire under cam, turn handle and wire is securely locked to arbor while spring is wound. No threading required.

**FREE-SAMPLE SPRINGS**

Extension Compression Right Hand Left Hand Torsion

Send us your spring forming problems — samples or dimension sketches—together with sufficient test material, and let us wind some sample springs for you free of charge. No obligation.

**32-Page Catalog** gives complete details on all Di-Acro Precision Machines—Spring Winders, Benders, Brakes, Shears, Press Brakes, Punch Presses, Notchers, Rod Parters, Rollers.

*pronounced Die-ack-ro

O'NEIL-IRWIN MFG. CO.
311 8th Ave.
Lake City, Minn.

di-acro PRECISION METALWORKING MACHINES

# 1 OR 1000 PIECES?

Few tools are called on to do the variety of jobs or to stand the punishment often expected of End Mills.

But, whether yours is a production job demanding precision with ruggedness, or just a machine shop job, GTD-AMPCO End Mills are for you.

The precision finish of shanks, uniformity of cutting teeth, exactness of size, combine to give you a rugged End Mill that is smooth and accurate in operation.

AMPCO TWIST DRILL DIVISION

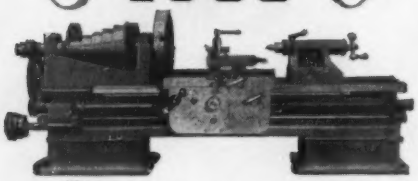
**GREENFIELD TAP AND DIE CORPORATION**

GREENFIELD, MASS.

5305

IN

# 1895

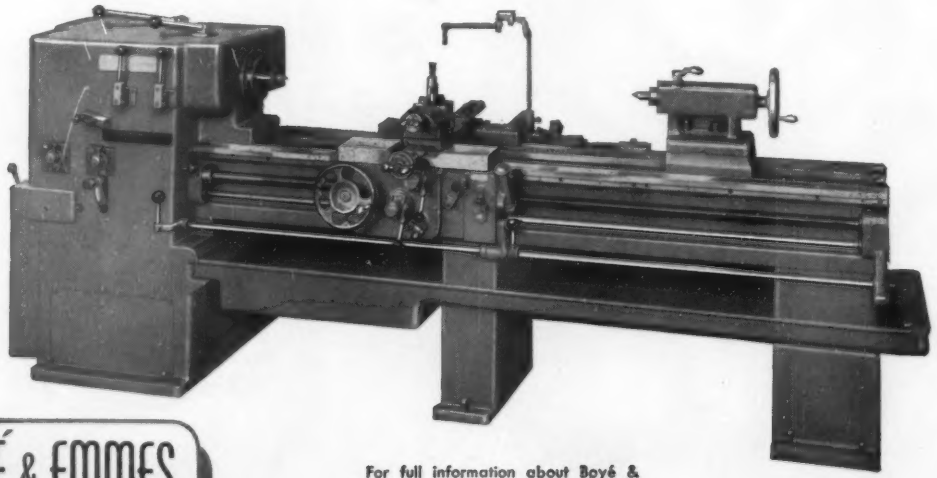


**BOYÉ & EMMES**
**LONG LIFE**
**ENGINE LATHES**
*looked like this!*

...In that year the Boyé & Emmes design featured a single back gear, which doubled the number of spindle speeds previously considered adequate.

*Today* **BOYÉ & EMMES LONG LIFE ENGINE LATHES**

incorporate the accumulated know-how of fifty-nine consecutive years of exclusive engine lathe manufacture.



**BOYÉ & EMMES**
**MACHINE TOOL COMPANY**
**125 CALDWELL DRIVE**
**CINCINNATI 16, OHIO**
MACHINE TOOL CENTER of the WORLD

**For full information about Boyé & Emmes extended range of spindle speeds and other modern design changes write for FREE Bulletin 5305. Ask also for our new folder "Fifty-Nine Years of Engine Lathe Evolution."**

**Spring locknut,** called Hi-Load, is designed to attain a tightening load on the bolt without use of a torque wrench, and maintain load under a spring pressure so that any change in the bolted assembly is compensated by the spring retention. Bolted assembly reportedly cannot vibrate loose.

*Morse Products Development Co, Los Angeles, Calif*

**Molded nylon tumbling media,** Nylaslugs, are available in various shapes and sizes for use in deburring and polishing fragile parts. Generally used with an abrasive of proper roughness.

*Rampe Mfg Co, 3320 St Clair Ave, Cleveland 14*

**Stamped wing-nuts** produced automatically at reduced costs are available in three styles: regular, extra-wide, and flat, in all machine screw sizes. Furnished in steel, brass, and aluminum.

*Jacobson Manufacturing Co, Kenilworth 10, NJ*

**Dynaco precision gears,** packed in kits, are available in three different kit sizes. "A," with which it is possible to solve every gear ratio problem, consists of 82 gears—every tooth number from 20 to 100 inclusive, plus an additional 1.000-in. pitch diameter. Kit "B" contains 34 gears, every prime number of teeth from 20 to 100 inclusive. With "C," 15 gears, it is possible to develop 195 commonly used ratios. Four diametral pitch sizes—48, 64, 72, 80—and two pressure angles, 14½° and 20°, are available in all selections.

*Dynamic Gear Co, Inc, Amityville, LI, NY*

**Plastic packing,** Flexrock 403, is composed of shredded Teflon combined with suitable binders and lubricants extruded into an open cotton yarn jacket impregnated with graphite. Chemically inert product is serviceable from –150 to 550 F and can be used on all packing applications, dynamic or static, that require use of Teflon.

*Flexrock Co, Packing Div, 3600-A Filbert St, Philadelphia 1*

**Structural adhesives** are available for bonding metal-to-metal and metal-to-plastic; one offers extremely high strengths at normal temperatures, the other extreme flexibility at elevated temperatures. Bondmaster M615 yields shear strengths of up to 3500 psi with peel strength of up to 19 lb. M616 provides shear strengths up to 3000 psi at 180 F.

*Rubber & Asbestos Corp, Dept P, 225 Belleville Ave, Bloomfield, NJ*


Mark

THE NEW YEAR WITH DATE STAMPS

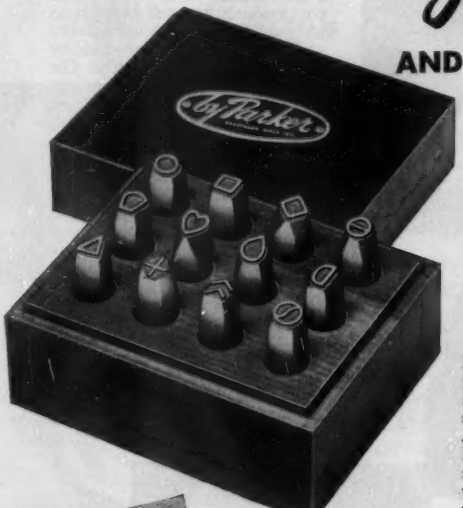
by Parker

Parker date stamps are used throughout industry to permanently mark tools, products, assemblies with confidential date of production. Sets consist of 12 alloy tool steel date stamps, each bearing the key letter — which changes annually — that denotes the year and a number to indicate the month. Stocked in 1/16", 1/8" and 3/16" character sizes or custom made to specifications.

Inspection

AND SYMBOL STAMPS

by Parker



CLEARLY MARK PRODUCTION DATA . . .

For countless identification applications on virtually all materials, Parker inspection and symbol stamps mark quickly . . . easily . . . permanently. Designed for lifetime use, these stamps are furnished plain or with one, two or three numbers within the border. Available in standard sizes of 1/16", 3/32", 1/8", 3/16" and 1/4" or special symbol stamps may be exactingly reproduced in any quantity to your specifications.

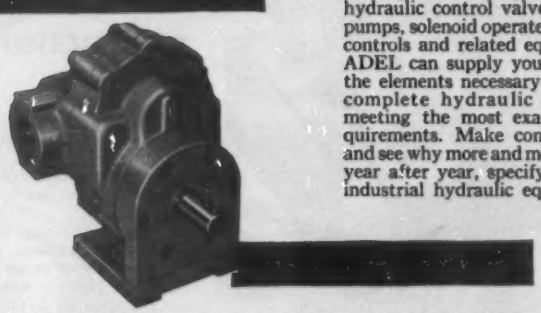
The answer to every industrial marking problem will be found in "Marking Tools" — yours upon request.

THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT
by Parker

# ADEL

**A COMPLETE LINE OF INDUSTRIAL HYDRAULIC EQUIPMENT FOR EVERY APPLICATION**

For fourteen years ADEL has continuously directed its energies to the advanced development and production of high-quality hydraulic equipment. With the most modern facilities in our 150,000 square foot plant, we build ruggedness, efficiency and compactness into each ADEL unit. The variety of equipment being manufactured has been steadily expanded until today it encompasses a complete line of hydraulic control valves, power pumps, solenoid operated remote controls and related equipment. ADEL can supply you with all the elements necessary to build complete hydraulic systems meeting the most exacting requirements. Make comparisons and see why more and more users, year after year, specify ADEL industrial hydraulic equipment.



A FEW SELECT TERRITORIES ARE STILL AVAILABLE TO PROGRESSIVE DISTRIBUTORS OF HYDRAULIC EQUIPMENT. INQUIRIES INVITED.

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# ROUND TABLE *Discussion*

## PRIMA DONNA

*What is the most effective way to handle the "special case" worker who considers himself above performing rountine work because he has proven his ability to handle the tough setup jobs?*

WHEN WE SIT AND PONDER a question such as what to do with a man who refuses to work except on special items, it occurs to us to notice how strangely our country has grown. Have we lost the ideals which have built the country and its economic state to this point? Has the thinking that only hard work can accomplish success been completely dissipated? What has been accomplished in the past 25 or 30 years in this respect . . . it is something to think about.

When our forefathers came to this country they did not find resting on these shores the wonderful buildings and an easy life. To exist they had to work. Of course there were some who wasted time and sponged off the others. That is why the early socialistic state started in our Plymouth Colony failed. It failed just the same as some day all so-called socialistic states will fail. The basic idea is wrong—a few supporting the many with the many living just as high in the social status as the few who work hard to support them. Something for nothing. No country has ever been able to achieve greatness for nothing. No business has ever succeeded by a policy of borrowing but never paying its debts. True, some do run a long time before the momentum of an individual or group fails to carry it on and the world comes toppling down on the cardboard plant.

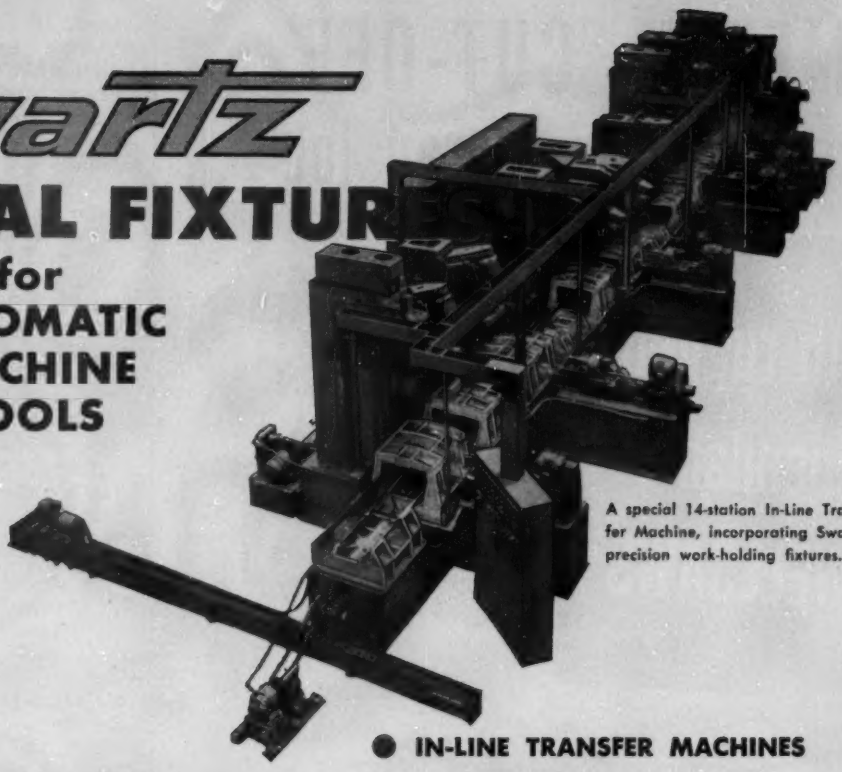
So it is with the individual who thinks he can live without giving. The man who is too good to do a job some day finds that there is no job. We now support these people with unemployment insurance; it is a good idea but has become such a racket. Why is a man entitled to unemployment when he refuses to work? The policy says he must accept a job in his own line if offered, but too many times there is a side-stepping of this. We are not living up to the ideals of our country. We all want something for nothing. It is a trend that will not make big men or a big country.

Now a man who considers himself an expert on one thing and shuns all else is certainly not a well-balanced

# Swartz

# SPECIAL FIXTURES

## for AUTOMATIC MACHINE TOOLS



A special 14-station In-Line Transfer Machine, incorporating Swartz precision work-holding fixtures.

- **IN-LINE TRANSFER MACHINES**
- **ROTARY INDEX MACHINES**
- **TRUNNION INDEX MACHINES**
- **SINGLE-STATION MULTIPLE-OPERATION MACHINES**

Station No. 1—Special 14-station In-Line Transfer Machine. Swartz fixtures were specified for dependable, on-the-job fixture performance.

Here is a 4-station Rotary Index Machine, equipped with Swartz fixtures. Swartz fixtures were specified for maximum service and dependability.

There are many advantages in specifying Swartz precision work-holding fixtures . . . advantages which are shared alike by both buyer and builder of automatic machine tools.

Of particular importance, is the seasoned experience, and specialized know-how which Swartz has gained through more than 30 years of fixture-building service to the machine tool industry. This experience and skill, together with the modern facilities needed to do the job, make Swartz service *complete* . . . from part print to finished fixture!

There are other advantages, too, in specifying and using Swartz fixtures. It will pay you to get the facts! A Swartz engineer will be glad to discuss your fixture requirements, and point out the many ways Swartz service can work for you *profitably*.

**Write Today** **Swartz service is outlined in this interesting new brochure, "Advancing Automation." A copy will be mailed on request.**

**SWARTZ TOOL PRODUCTS**
*Division of Jefferson Corporation*
13334 FOLEY AVENUE • DETROIT 27, MICHIGAN

**Designers and Builders of:** Pump Jigs • Standard Fixtures • Fixture Locks • Special Fixtures for Automatic Machine Tools.

# METAL "CUT-OFF" becomes a preferred job . . .

with rugged dependable "WELLSAWS"

**featuring . . .**

- **Easily Controlled Operation**
- **Fast, Accurate Action**
- **High Job Productivity**
- **Low Operating Cost**
- **Long, Dependable Service**

● Production, or utility "cut-off" work in your shop becomes a *Preferred Job* with a Wells Horizontal Metal Cutting Band Saw, because the *operation* is so *easy to control.* Even in the hands of the "new guy," a Wells Band Saw can be counted on to *Reduce* your *Production Costs,* through greater efficiency, more accurate cutting and real dependable service.

Another important *"key"* to better cutting . . . *New Constant-Load, Fool-Proof Blade Tensioning Control* found only on Wells Saws. And, for *more job profit* . . . Wells-O-Bar Feed Master will convert Models 8, 800 or 12 into automatic cut-off machines for duplicate cutting.

Big Jobs, or Little Jobs, there's a "Wellsaw" for every metal cutting job around your shop. Standard capacities from 3½" x 6", on the new 49A "two-in-one" saw, up to 12¾" x 16", on the No. 12 Heavy Duty Unit. Special machines have capacities of 24" and larger for Extra Heavy Duty and Unusual Jobs.

Call your Wells Distributor, or write for *Job-Engineering Service.*

Wells

*The Pioneers of Horizontal*

**METAL CUTTING BAND SAWS**

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT RD., THREE RIVERS, MICHIGAN


person. He has found a way to convince his boss he is too good to work and that his talent must be protected. It is a clever idea, the attitude of a clever salesman, except for one thing. What happens if the work is eliminated? This clever man then has created for himself such a reputation that no one will ever hire him again. Again the world collapses on a paper-built idea. It does not pay to become too specialized and to brag about it. It is better to specialize and also be humble. Your demands are just as quickly answered . . . perhaps more so.

The case in question certainly is not alone in its concept. There are many individuals who have built up in their own minds how important they are, but actually the world runs right along without them when something happens to remove them from the scene.

Our friend Stone must not be allowed to get away with this program of sitting down and attempting to become important. Is he so valuable that his leaving would shut down the entire plant? Is he so important that the foreman is afraid to properly do his own job of running the department efficiently and without excess in costs? Probably not. Stone has had the nerve to develop an idea and has so far been able to out-bluff his superiors. But the cards are now down. No company can carry a man working ¼ of his time at full pay rate. The foreman no longer can cover up his inefficiencies in his department. The day has come to clean up the mess left over from lush and lax operations. Time to stop the individual demands of those who are sponging off the company. Let these persons put their shoulders to the wheel and push rather than drag their feet.

We can stop this foolishness if we want to. But it will call for everyone of us to do the job which we

*"I don't get it—I came to pick up the laundry, your boss hollers at me for being late, gives me two weeks pay and fires me."*

have to do efficiently, and without glory, in many cases. Tell Stone he must go to work or look elsewhere for a job. Start the new man on Stone's work. See that you, Mr Foreman, are in control of your departments—not the workers controlling you.

It is true that good men are hard to get, but they will be harder if you don't stop babying them. Remember that this is the policy that starts the job-hopping.

Charles D Townsend
*West Hartford, Conn*

IF OLD MAN STONE gets all the tough jobs, which are his delight, and his wage scale is based on his ability and value to the company, he should be willing to work on easy jobs also. There should be no objection to his coasting for a couple of hours at the end of a tough job if he is the kind of a guy who goes all-out to complete the job in the shortest possible time and has actually done a normal day's work.

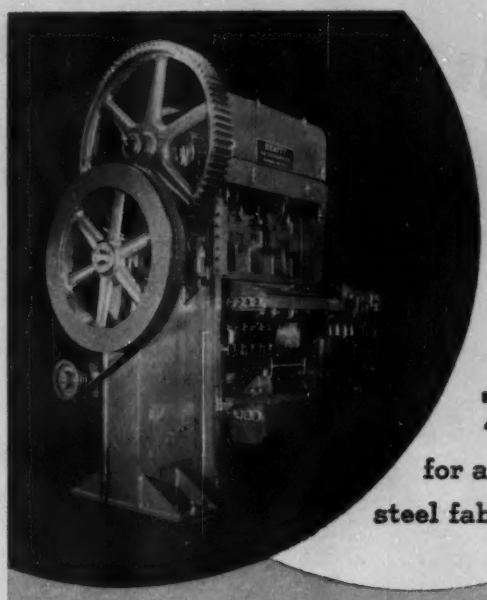
However, Old Man Stone cannot be allowed to upset the morale of the whole shop, because if Al condones a prima donna in the screw machine department he will have to go along with prima donnas in grinding, milling, gear cutting, toolroom, etc. If the old cuss gets away with his independence too long, and gets real cantankerous, he may later turn up his nose at jobs that he now accepts. Prima donnas are OK at the Met but in a shop they produce discords instead of harmony.

Carl A Johnson
*Euclid, Ohio*

WHEN A MAN THINKS that he is good it is a nourishing thought which keeps him in the pink but, when he is of the opinion that he is too good for the regular run of work then it is time for him to buy a one-way ticket. Whenever anyone outgrows his shoes then it is time for him to get himself another pair.

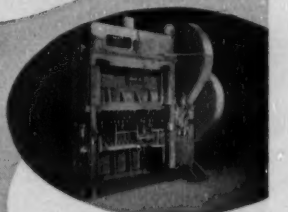
I cannot understand why a man should think that he is above the other workers unless he possesses some of the characteristics of a dictator. Why Stone should feel that he should go about selecting his own jobs, even though they are stickers for solution, is beyond me. Furthermore I am at a great loss to figure out a boss who would put up with such a man.

The foreman's duty is to assign jobs to the men he thinks can best handle them and to supervise their being done properly. It should be

This Beatty Punch CUT COSTS 75% for a structural steel fabricator

One of our present-day satisfied customers formerly employed machinery using only one punch for punching structural steel shapes. After consulting a BEATTY engineer, this firm installed a BEATTY Guillotine Beam Punch with an adjustable tooling feature that enables them to perform exact repeats of multiple punch patterns in 25% of the time formerly required. Naturally, we can't guarantee such substantial savings in every industrial installation of BEATTY machines! But, if you're currently considering additional production machinery for your metal fabricating plant, better see a BEATTY engineer before making any final decisions! Chances are he'll have an idea or two on how you can achieve greater production economies with BEATTY Machines!

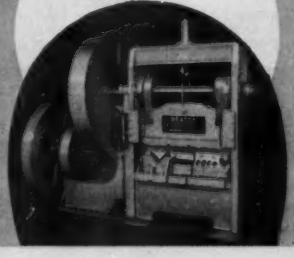


BEATTY Guillotine Beam Punches are available for punching webs and flanges in "I" beams from 6" to 30".

BEATTY Spacing Table handles web and flange punching without roll adjustment.

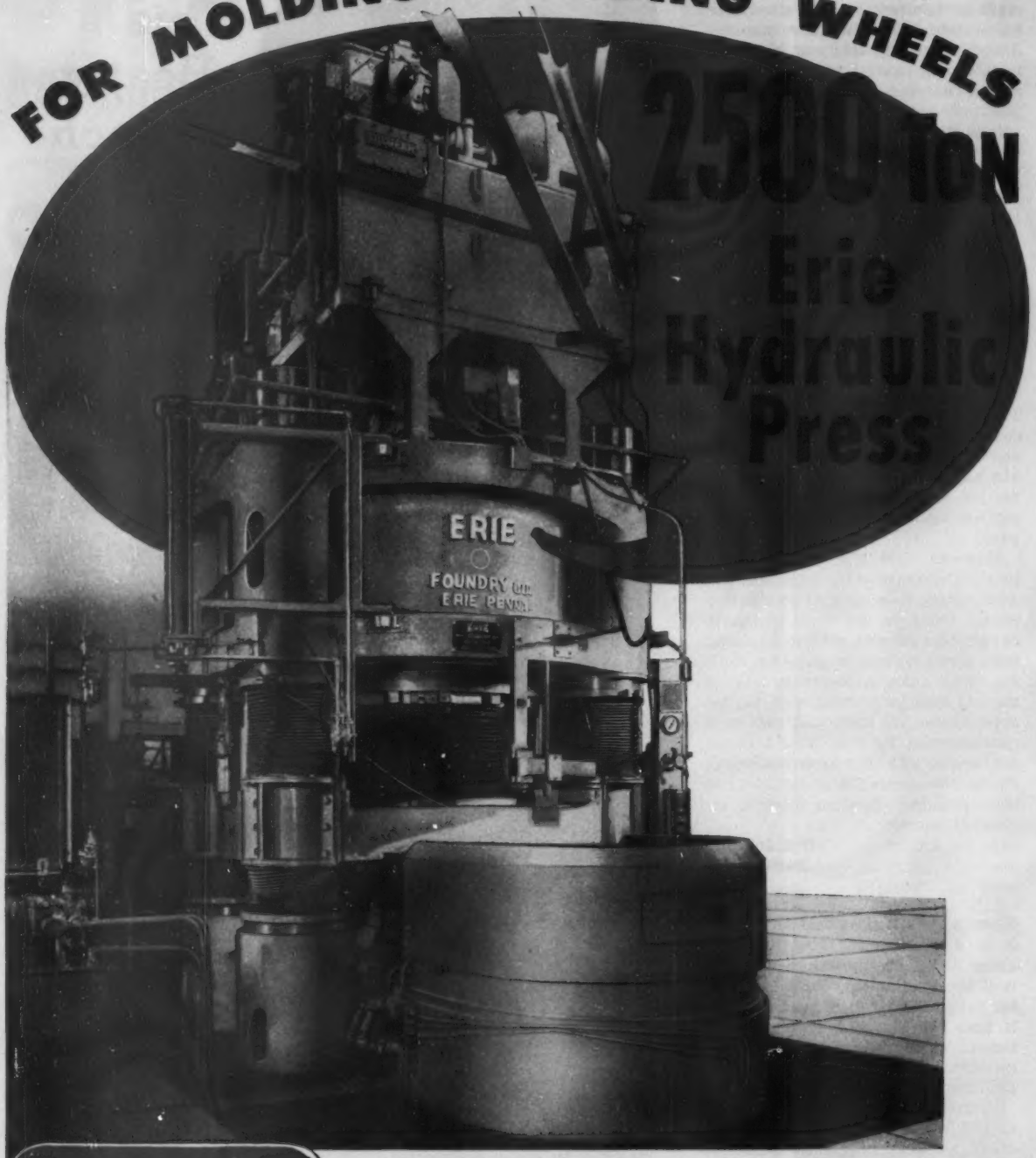
BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.



BEATTY
Machine & Mfg. Company
HAMMOND, INDIANA

# FOR MOLDING GRINDING WHEELS




**ERIE**

TYPICAL of the hydraulic presses designed and built by Erie Foundry Company is this one in the plant of a leading manufacturer of grinding wheels.

OVER 50 years' experience in the manufacture of metal, rubber and plastic-forming presses is represented here. Consult with us on your hydraulic press requirements.

**ERIE FOUNDRY COMPANY** ERIE, PENNSYLVANIA

*Dependable* **HYDRAULIC PRESSES • FORGING HAMMERS**

left to his judgment to decide who gets what. We don't run our shops like cafeterias, where one can go along making the selections that appeal to him; we run them from the top. The workers are hired to do a certain class of work and if their stomachs are too delicate to handle the work given to them then the best thing for them to do is to find another "eating place."

Granted that an individual may have an edge over others in handling some problems, it is my opinion that he should be modest enough about his superiority and do what he can to conform to regular shop procedure.

An individual of Stone's type can do more to upset the regular routine of a shop by his independence than any other. He may live happily bathing in his own glory but he certainly does get the foreman into a precarious situation.

There are some guys who are good and who know it but who tactfully keep their own opinion under cover. Then we have that "select" few who take great delight in seeing how difficult they can make it for their buddies and their boss. As long as a foreman will put up with such an individual he has no one to blame but himself for the many difficulties he finds himself in.

Jack Everett
*San Francisco, Calif*

Most of us at some time or another in our machine shop experience have run across an Old Man Stone, who is a distinct asset to the shop, yet at times can be a source of irritation because he feels his extraordinary ability entitles him to preferential treatment when work assignments are being made.

If we look at the shop genius objectively, on a strict dollar-and-cents basis, however, and realize that

*"Shall we join the ladies?"*


Which of these jobs gives you trouble?

Oakite has 6 new ways to help you

Oakite chemists have developed efficient new materials for the six important jobs listed below. One of these new materials may provide the perfect solution for your most difficult problem.

1 **HEAVY-DUTY CLEANING IN TANKS:** New material combines the best qualities of alkaline and solvent cleaners.

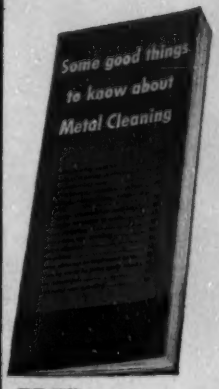
2 **PHOSPHATE COATINGS:** One material cleans steel while applying dense iron-phosphate coating. Another surpasses government specifications for heavy zinc-phosphate coatings. Lasting paint adhesion, protection against corrosion, ease of control.

3 **ETCH-CLEANING ALUMINUM:** Uniform etching in preparation for anodizing or painting. Scaling and sludging minimized or eliminated.

4 **ELECTROCLEANING BRASS:** Efficient, economical cleaning without danger of tarnish.

5 **INHIBITING PICKLE BATHS:** Liquid inhibitor for sulphuric, hydrochloric and phosphoric acids. Saves steel, saves acid, builds own foam blanket to suppress pickling fumes. Easy to add to continuous strip or batch pickling operations.

6 **STRIPPING PAINT:** Two solvent strippers for synthetic enamels and other tough finishes. One so viscous it adheres to vertical surfaces of objects that can't be stripped any other way.




FREE

Circle the coupon number corresponding to the job that gives you trouble. We'll send information about the new material for the work, also our 44-page illustrated booklet "Some good things to know about Metal Cleaning."

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

OAKITE PRODUCTS, INC.
24 Rector Street, New York 6, N. Y.

Send me a FREE copy of "Some good things to know about Metal Cleaning" and tell me more about the new Oakite material for the job (jobs) corresponding to the number (numbers) I've circled below.

1 2 3 4 5 6

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Company_____

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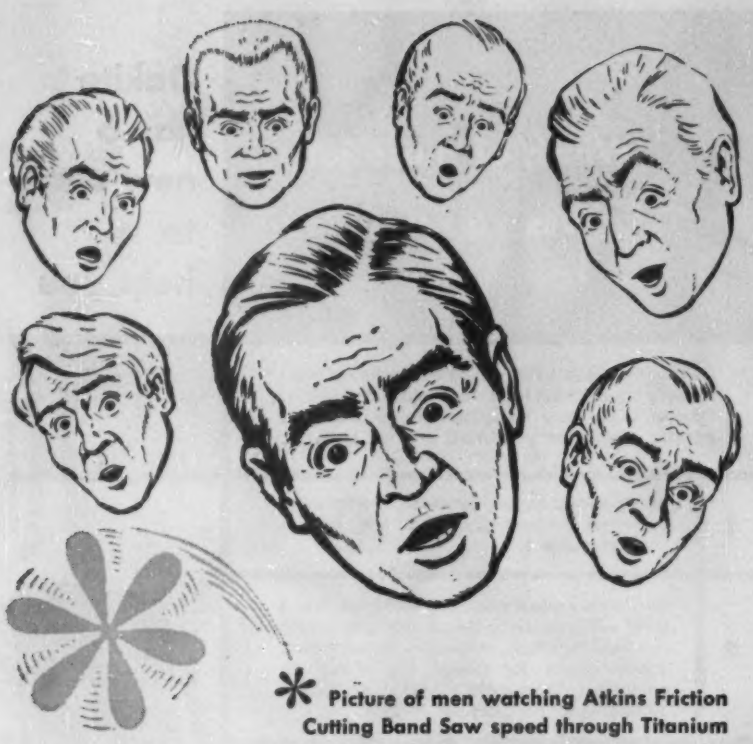

* Picture of men watching Atkins Friction Cutting Band Saw speed through Titanium

No metal is too hard . . . no job too tough for Atkins sensational new friction-cutting band saw!

Specifically developed by Atkins to cut metals like titanium and stainless steel castings, this miracle band saw now sets new speed records whenever used!

**ATKINS BAND SAWS GIVE YOU BETTER CUTTING ON EVERY METAL—EVERYTIME!**

- **Skillfully Milled**—Newly developed technique—guarantees uniform teeth.
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- **Choice of Types, Set, Teeth available.**

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**BORG—WARNER CORPORATION**

INDIANAPOLIS 9, INDIANA

ATKINS Silver Steel SAWS

B-W ENGINEERING PRODUCTION

his ability pays off when the chips are down his true worth becomes apparent, and we can tolerate his display of temperament. Maybe if friend Al could cultivate a so-what attitude toward Old Man Stone when he feels like sitting down and watching the machines run, things would go along better, on the theory that if you ignore an irritation it will disappear. Should he decide to be more realistic about the old boy he could pretend he was a piece of special machinery that only came into use several times a year, but more than paid for itself when called into service.

So far as the man's refusal to go into the toolroom is concerned, there may be method in his madness. He perhaps realizes that if he went there he would lose much of his prestige. In short, he would be just another good man among several others—a little frog in a big puddle, instead of a big frog in a little puddle. However, if his genius lies in setting-up I am of the opinion he would be wasted in the toolroom. Why not bring the toolroom to him? Put him in a corner of the shop that he can call his own, with several of the basic machines, such as a lathe, milling machine, grinder and drillpress. Make him responsible for keeping the machines running during the intervals he isn't setting up and perhaps put his ingenuity to work devising better methods of doing the work already in process. I don't think it does any harm to humor an individual like that, even to the extent of putting up a wired-in inclosure of his very own. It may pamper his ego a trifle, but if it produces definite results it will be well worth while.

Another way to handle this type of individual came to my attention some time ago. He, too, was a genius when it came to making setups, but

*"Henshaw really looks alive on payday . . ."*

when given an ordinary run-of-the-mill job to do he was notorious for taking a walk. The foreman hit on the ideas of making him a one-man quality control review. When not engaged in setting-up he was delegated to make the rounds of the machines and check a piece occasionally to see if it was up to snuff. If the operator had trouble of any kind he could be depended upon to pitch in and get things running again.

I think the moral to be drawn from it is that there is a type of individual who isn't happy unless his abilities are being challenged, just as there is the individual who is satisfied to plug along day after day at the same routine task. Both are essential to production and it is the foreman's job to fit them into the scheme of things. Maybe Al hasn't found the right approach to Old Man Stone.

Robert S Alexander
*Glastonbury, Conn*

•

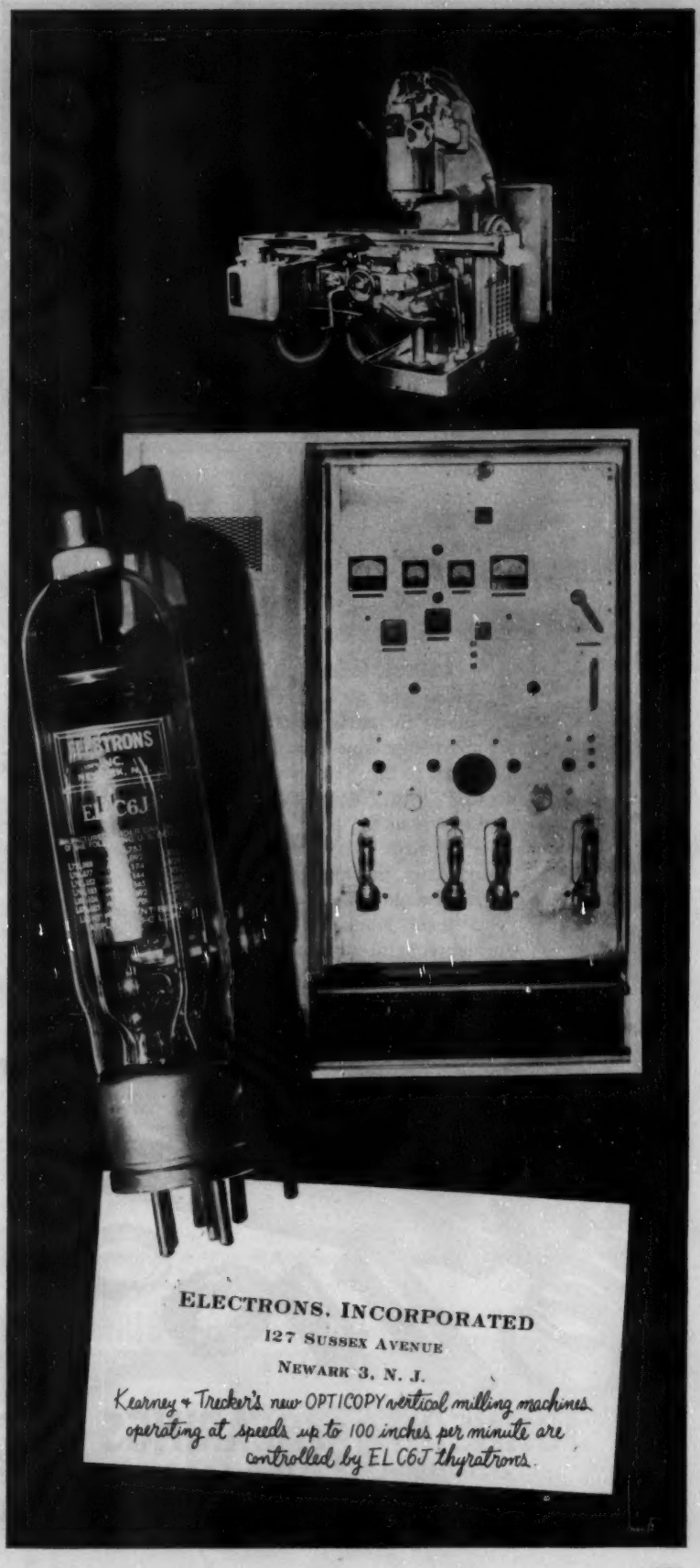
## LITTLE BLACK BOOK

***What is the best method of handling a worker who is convincing new men in the shop that he has machining data even the foreman doesn't possess? Laugh at him, or fire him?***

HERE WE HAVE THE CASE of the self-appointed wise man with his little black book who professes to know all the answers, but who hasn't got the sense to realize that his actions embarrass his foreman and adversely affect the efficient administration of the department and his standing in it. There can only be one leader in the department, and management has appointed him as foreman and delegated authority to that individual. Any actions by his subordinates which interfere with the foreman's activities should not be tolerated in the interests of good administration.

Smith may think he is building up prestige for himself by the gratuitous advice and help he is giving his fellow workers, and in particular the new men, but he is apparently unaware of the fitness of things and his proper place in the organization. He should try to remember that others have found wisdom in the proverb: "Never give advice unless asked." And even when asked for advice, a man should weigh the circumstances surrounding the request before giving forth with information.

The foreman who is unfortunate enough to have an omniscient "Helpful Henry" in his group, and he is not an uncommon breed, usually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SLEEVE BEARING HEADQUARTERS SINCE 1901

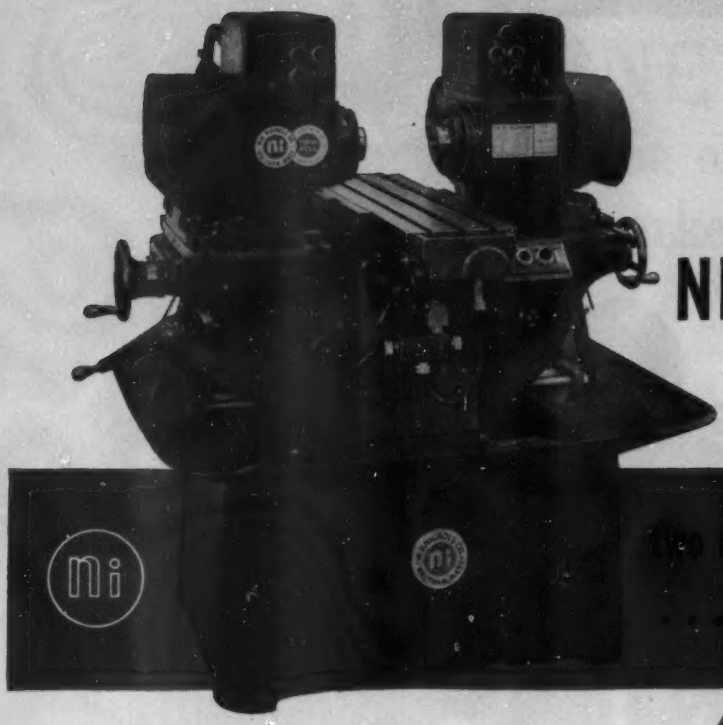

finds that this disrupter displays an exaggerated desire to rise above the crowd and attain distinction among his fellow employees by methods that are distinctly undesirable and improper. He lets his vanity run away with his better judgment. The way to handle this type of worker is for the foreman, in the privacy of his office, to give the man the cold facts of life in an industrial shop. He should be impressed with the fact that working for a company is working for the foreman, and making him like you. Smith should try pleasing his boss instead of antagonizing him with self-inflicted, egotistical, know-it-all actions. What the foreman can do along positive lines is to suggest to Smith that he has the opportunity to release some of his creative energy and also satisfy his desire for recognition by making improvement suggestions through the suggestion box.

Of course if this line of foreman-counseling action does not put the quietus on Smith's activities along foreman-usurpation lines, then firing is justified.

It's the effect that men of Smith's type have on new workers that makes the situation so hazardous for the foreman. What Smith is doing is not only undermining the authority of the foreman with some of the older men but misleading the newer employees on proper rules of conduct and foreman relations in the shop. When he's got the new men half-believing that he's on the inside track with management, the foreman will certainly have difficulty in commanding the respect and attention of his men.

Aside from straightening out Smith, the foreman should pay more attention to the induction of new men. The new man should not have to go to Smith to get information on

*"Allow Me!"*



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Two heads are better than one ... for sure!

**The Nichols Twin Mill is something new in duplex millers — a precision 2-spindle bed-type miller designed for simultaneous light duty milling of opposite or adjacent surfaces, using horizontal or vertical spindles.**

**The Twin Mill provides unmatched flexibility! It is equally adaptable for long-run or short-run jobs. The two geared milling heads are independent units, with separate 1 HP motor drives, and are quickly adjusted either directly opposed or offset longitudinally, vertically or transversely. Set-up is fast and simple.**

**The wide range of spindle speeds from 55 to 2050 R.P.M. allows milling of ferrous or non-ferrous materials with high speed or carbide tipped cutters, producing EXTRA FINE FINISH while maintaining the closest tolerances with ease.**

**The Twin Mill is completely push-button controlled, arranged for automatic table cycling — with rapid approach, hydraulically controlled variable cutting feed and rapid return. Available with automatic retraction of milling heads, automatic spindle brakes and carefully engineered special features to meet specific applications.**

**The parts shown are typical of those on which the Twin Mill is cutting costs and boosting production. Investigate the savings it can make for you. For details write to Nichols-Morris Corporation.**

## CONDENSED SPECIFICATIONS

| | |
|---|---|
| Table, working surface | 8⅝" x 30" |
| Table Travel—cutting stroke | 11¾" |
| Motors | (two) 1 HP |
| Spindle Speeds (15) | from 55 to 2050 RPM |
| Max. height center of spindle above table | 11¾" |
| Max. offset of spindles (horizontal) | 8½" |
| Max. distance between spindle noses (across table) | 16" |
| Floor space required | 64" x 56" |

**Manufactured by W. H. Nichols Company, 48 Woerd Avenue, Waltham 54, Mass.**

**76-F Mamaroneck Ave.** NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION** **White Plains, New York**

**BLINDED BY TEAR GAS but still shooting, a killer, twice-escaped from prison, staggers out of a Los Angeles bungalow into the arms of Sergeant Friday and his partner. Jack Webb, as Sgt. Friday, stars in this true-to-life series based on actual police cases. With "Badge 714" began a race against time in which millions of dollars are involved. Air Express helps NBC win it.**

# "DRAGNET!"

## How the top detective drama of all TV networks is also seen locally in 152 markets as "Badge 714"

Continuing its highly successful run as the leading program on the NBC-TV Network, "Dragnet" has proved so popular that, in addition, it is being re-run throughout the country as "Badge 714." This local syndication schedule is made possible only by Air Express.

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**—$8.55 less***

POLICE FILES provide the material that keeps about 65 million Jack Webb fans glued to their TV sets each week. A large percentage of them see him under syndicated (locally sponsored) title "Badge 714." Schedules to the 152 syndicated markets are rigid. Air Express gets the film there on time.

**WHO-TV, DES MOINES**
**—$3.47 less***

JACK WEBB INSISTS that sets be built to duplicate Los Angeles Police Headquarters, to the very door knobs! It is this passion for realism which attracts audiences for "Badge 714" worth millions of dollars to sponsors. NBC can't afford to have film arrive late, and so it is shipped regularly by Air Express.

**KFEL-TV, DENVER**
**—$5.51 less***

FROM BIG CITIES and small towns, people write in to ask whether Sgt. Friday isn't an actual member of the Los Angeles Police. Many television stations are in cities with no airline connections, but Air Express connects through Railway Express. "Badge 714" films get there on schedule, just the same!

**KXLF-TV, BUTTE**
**—$4.87 less***

A MADMAN tried to blow up the Los Angeles City Hall. Jack Webb made it into his first NBC "Dragnet" show. Now it's making history again as "Badge 714," the hottest syndication property in the industry. "Air Express makes our syndicated operations possible," says NBC's Frank Lepore, head of Film and Kinescope Operations.

**WLWA-TV, ATLANTA**
**—29¢ less***

THEY CALL IT "BICYCLING." Every week, NBC Film Exchanges in New York and Hollywood have 4,000 film or kinescope programs in circulation to and from stations. This method, called bicycling, saves thousands of dollars in film and shipping costs. It is only possible by Air Express, with its ability to pinpoint shipments.

**KSD-TV, ST. LOUIS**
**—63¢ less***

HUMAN ERROR does occur. One film arrived in Springfield, Missouri, addressed to Station WICS. The Air Express Agent wired NBC, "No WICS in city. Please advise." The film was trans-shipped to Springfield, Illinois (where there *is* a WICS) and arrived in time! Alert agents protect against error or changing circumstance.

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*Less than any other air service (from N. Y.) that includes door-to-door pickup and delivery. "These are examples of what we save on 87% of our air shipments by using Air Express. With 97,000 NBC shipments a year, the figure is impressive. The one thing that impresses us more is Air Express service."—*Frank C. Lepore, Mgr., Film and Kinescope Operations and Services.*

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machining operations or jig and fixture details—that information should be made available to the new men and they should know where to get the offiical information and drawings in the shop files. The foreman is the key to practical application of the induc ion policy. It is to him that the new employee looks for guidance and help in meeting the new situation. He is the logical person to make personal introduction to other workers, to arrange for required tool kits, equipment, and iden'ification, to orient the new man with respect to necessary information required to perform his job such as machining operations data and necessary drawings for his work. The design of tools, equipment, machines, jigs, and fixtures has become an extremely complex task which can best be performed by the specialists in the Engineering Department.

The question is asked: "Is Smith too far gone in his outrageous ideas to be worth keeping in the company, or would firing be unjust?" The answer to that question is that even though some sort of ac'ion appears necessary to maintain discipline and morale, it is wise to proceed slowly until the whole matter has been thoroughly analyzed to find out the true nature of the problem. Thereafter the proper action is usually fairly clear and should be taken promptly and firmly. It should be remembered that firing the offender Smith will make the situation take on a more important aspect than it deserves. However, since Smith is doing what amounts to undermining the authority of the foreman with his men, and if he tells the men that he's so valuable to the company he can't be fired, and the men believe him, the consequent loss of authority and perstige by the foreman, if Smith is kept on, makes handling the problem difficult. Smith seems to be an

*"Said he'd drop dead before I'd get my raise. He did and I got my raise."*

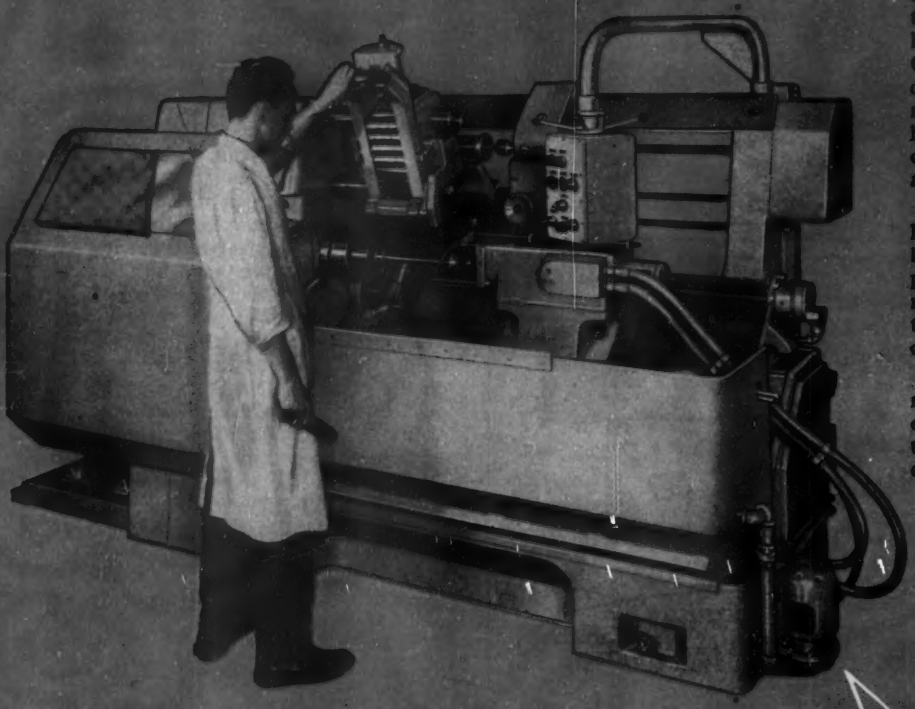
# A REVOLUTION IN TURNING METHODS!

# PILOT

**COMPLETELY AUTOMATIC**

*high speed* **HYDRAULIC COPYING LATHE**

*for complete automation!*

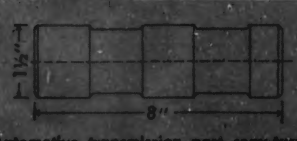


This H. E. B. PILOT – built by IMPCO, Lansing, Mich. – is now copy-turning transmission parts in the plant of one of the country's leading automotive manufacturers. Of course the job could have been done on any of half a dozen ordinary machines – but only the PILOT holds tolerance to .001" both on diameter and length *using only two tools!*

Operation is so easy one man can handle three machines at once. He has only to load the simplified hopper and the PILOT rapidly does the rest automatically – including ejection of the finished parts onto a conveyor.

The PILOT'S simple tooling permits great savings in the cost of expensive carbide tools, and downtime for tool changes is slashed drastically.

The H.E.B. PILOT results in enormous savings in the turning of many parts. Because of the accuracy and finish obtained, subsequent grinding is also reduced tremendously, if not eliminated altogether. For a demonstration or our comprehensive catalog, write, wire or telephone us now.




**Automotive transmission part copy-turned in a total time of 50 seconds using just 2 tools and holding a tolerance of .001".**

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*Copying Lathes*
*Engine Lathes with Copying Attachments*
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Don't take our word for it. We'll be glad to show you our long list of satisfied users, machine tool manufacturers that have used Gusher Coolant Pumps as standard equipment on their machines for *ten, twenty, thirty years.* Honestly, it reads like a blue book of the leading machine tool manufacturers. *Follow the leaders.* Specify Ruthman Gusher Coolant Pumps for all your metal cutting machinery.

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otherwise intelligent employee, and probably disciplinary action in the form of a reprimand or casual correction by the foreman may be extremely beneficial in leading him in the right direction.

Ed's suggestion about telling Smith off in front of the men as a means of squelching him and tipping the men off that he isn't so vital, is a hazardous move that may not be as effective as a private meeting. A foreman should be guided by the seriousness of the offense and circumstances surrounding it before reprimanding workers in public. He should reprimand before others only when the worker is openly violating an important rule.

Al seems to fear that Smith might claim he was picking on him by bawling him out in public. But Al should remember that if his discipline is inconsistent, and if he lets down the bars in one particular case, he will have difficulty keeping them up in others. Al should make his discipline consistent; he shouldn't let Smith get by with something today and then jump down his throat for the same thing tomorrow.

Smith's actions are neither ethical nor wise. He is creating friction between the workers and the foreman by attempting, perhaps unwittingly, to lower the foreman's prestige.

How can Al best straighten out the men who half-believe that Smith has an inside track? I would recommend a re-indoctrination of these men by the foreman in correct shop procedure and conduct to dispel any doubts as to who the foreman of the department really is and what he wants from his men. Neglect in asserting authority and making cold facts plain to the workers leads to poor morale and improper functioning of the department.

It seems to me that Smith has no ulterior motive of trying to get the foreman's job. He's just foolishly

*"Tell the boss not to look for me till noon. I gotta catch up on the Bulletin Board."*

kicking around his inflated ego filled with immature enthusiasm for the edification of his fellow-workers and to the detriment of his foreman. Smith should remember that a fool always finds one still more foolish to admire him. And that a learned fool is more foolish than an ignorant fool.

Harry Kaufman
*Philadelphia, Pa*

I DON'T THINK SMITH is too far gone in his swelled-headedness over his value to the company, and unless his vanity so completely takes his head as to cause him to ignore or defy his foreman, Al should be able to turn Smith's weakness to good account.

This myth of one's indispensability is a very human weakness from which more of us suffer than may commonly be supposed. Was there ever, for example, an assistant manager who did not quite sincerely believe that, given the chance, he could fill the old man's shoes more efficiently than the old man himself?

Such an attitude of mind is a form of vanity from which some astonishing results could derive, did we but possess the knack of successfully appealing to that vanity, getting it on our side, and harnessing it to the interests of the company.

People who are swelled-headed usually cherish ambitions, and people who cherish ambitions are not dumb clucks. No matter how far short their performance may fall of their own opinion of their ability, the fact that they are ambitious is evidence of thinking, and people who think about their work, usually are well worth keeping in the company.

The keeping of a "little black book" for notes and reference about the work should be encouraged in the men, properly fostered; the habit can become infectious, and once it becomes sufficiently popular and widespread, it ceases to be unique.

Smith's very evident feeling of superiority probably springs from the fact that he alone takes the trouble to record times and facts relating to the work. It would be a mistake for Al to attempt to discourage this excellent practice, but in order to reduce the swelling in Smith's head, Al would be well advised to encourage others of the men to follow his example regarding the keeping of data. The more commonplace the activity, the less the temptation to swagger. Millions must have climbed little hills, only the select few can boast an Everest.

Firing Smith would be notoriously unjust, no matter how vain he may


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"After witnessing your comparative demonstration, we decided to use Eagle-Picher Industrial Floor Dry. The results have been highly satisfactory."

You, too, can witness the difference in floor absorbents! With his portable laboratory, your Eagle-Picher man will analyze your floor absorbent *right in your office*. You may actually conduct the test yourself! Without obligation, of course.

**Here's what the test shows—**

- The amount of oil and water absorbed for given bulk.
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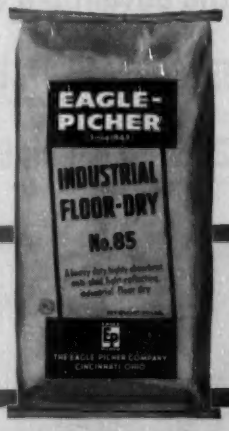
You'll see that Eagle-Picher Floor-Dry is insoluble, chemically inert and non-combustible . . . that it combines light weight for exceptional coverage with light color for brighter, safer working areas. Write today for the full story.

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**This leaflet tells how Lusol works to the advantage of the machine operator *and* management**

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on the opposite page

be. Al would have no real justification for such a course. I cannot see much force in Al's contention that Smith is undermining his authority merely by boasting he is so valuable to the company that he can't be fired. Al's argument that some of the men are new is no proof that they are soft or more likely to be impressed by Smith's vaporings than the old hands.

No, Al, it won't wash. If Smith, merely by a little swaggering, can undermine your authority with the men, the time is ripe for you to do a little research into your own method of impressing on the men the quality and degree of your authority over all, not excepting Smith.

Al can best disillusion the men who half believe in Smith's pretentions, at the expense of Al's authority, by running his section on commonsense lines,—by changing people around, including Smith, when he is satisfied the time is ripe for such action and that the section will benefit from it. He can conduct himself with confidence and dignity and, by his competent handling of each situation as it arises, impress on all concerned that he has his finger on the pulse all the time and is not in the hands of any of his men, Smith included.

He can pay much more attention to the dignity attached to his position as foreman, exert himself more, and shun the lazy way of getting information from Smith's little black book for no other reason than to save himself a trip to the files. By the way, why should a trip to the files be necessary? All significant data concerning Al's section should surely be on file, at his hand, in his own office.

So long as Al pursues such a doubtful course as resorting to Smith for data, he need not blame Smith's swaggering for undermining his authority; Al is actually undermining his own authority.

It is quite evident that the older hands are more amused at Smith than impressed by him. About the most sensible pronouncement from Al on the subject is his reluctance to have a showdown and thus vest the matter with an importance it does not merit. I think Ed's advice to ignore Smith and, later, to get the men together in order to "tell them" about him is wrong by any standard. No foreman can afford to ignore a man of Smith's capacity for detail; Al must make use of him and his talent, by placing him where he will register most effectively on the company balance sheet. He must not give Smith free publicity by getting the men together to discuss him or his pretentions.

If Smith's data is valuable, as Al asserts, Al should lose no time in recommending that he be kicked upstairs where his talent for detail, in the matter of machining data and jig and fixture design, could be used to better purpose than by merely collecting it in a little black book in order to give himself the appearance of a big shot. Such a move might bear fruit and would be more of a solution than accepting Ed's suggestion to tell Smith off before the men, thus presenting him with a golden opportunity to cry discrimination.

C Donald
*Lanarkshire, Scotland*

•

## PARKIN' PRIVILEGES

*Do certain privileges accorded a foreman, such as a reserved parking spot, tend to increase prestige and respect for his job among the men, or will it have the reverse effect?*

SOME OF THE PROBLEMS involved in this topic are not very important. Everything is more democratic now

*"No No! Dimley, You weigh, and Dudley You count."*

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# WE DARE SUGGEST A SHOP-WIDE TEST!

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**THE DIFFERENCE**—Unlike ordinary coolants, Lusol is an oil-free, all-chemical concentrate to which you add water to suit the machining operation. Water, the best coolant known, is made wetter so that it gets to the tool point and carries off heat faster. With Lusol there is no rusting, no skin irritation, no smoking to foul shop atmospheres.

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These benefits become shop-wide as your workmen recognize Lusol's advantages and ask for it in their machines.

**AN OFFER**—Prove to your own satisfaction—in your own plant, in your own machines—that Lusol will do all we say it does. Our field engineers will help you clean out the machines marked for the test and install Lusol in proper concentrations. Past experience in hundreds of metal working machines indicates you'll do jobs faster and better.

**TO GET THIS TEST WORKING, MAIL THIS COUPON**

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☐ Send me the leaflet, "Case Histories of Lusol at Work" and any other data.

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☐ Have your man call to discuss arrangements for installing Lusol All-Chemical Coolant in the machines selected for this test. ( )

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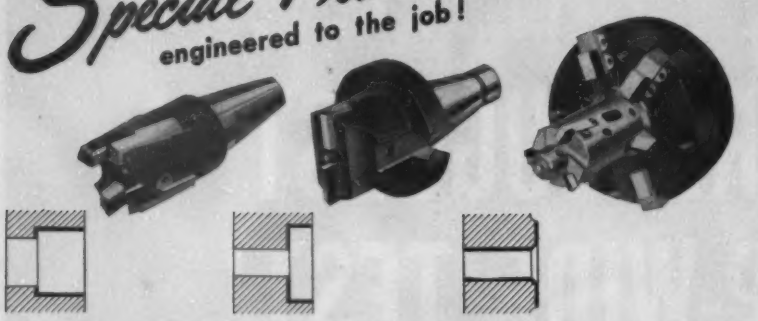
engineered to the job!



**Combine Related Boring, Counter-Boring, Facing, and Chamfering Operations Into Just One Tool**

## PRODUCE BETTER WORK FASTER and at LOWER COST

● How can you keep competitive if you do four operations, when your competitor does only one?

Cut your costs and increase your output with McCrosky's "Multiple Operation" specials. Engineered specially to your individual work conditions, a McCrosky Special combines 3, 4, 5 or more related operations — does them all simultaneously with one tool — and one set-up — assuring unvarying uniformity of finished product — eliminating repeated handling — reducing the amount of work in process — speeding up deliveries and producing other economies so great that they pay their way even on moderately short runs.

*Write for Bulletin No. S-18. It can really save you money!*

COST CUTTING TOOLS **McCROSKY TOOL CORPORATION** MEADVILLE, PA.

*Engineering and Sales Representatives in the Principal Cities*

| | |
|---|---|
| *Jack-Lock*® MILLING CUTTERS | 3" to 24" in diameter. |
| *Universal* MILLING CUTTERS | Up to four times as many blades as the cutter diameter. |
| *Super*® *Adjustable* REAMERS | 15/16" to 6" in diameter. |
| *Wizard*® QUICK CHANGE CHUCKS | Change drilling tools without stopping the spindle. |
| *Turret* TOOL POSTS | Gives engine lathes the versatility of turret lathes. |
| *Block Type* BORING BARS | Centering V-key locks cutter block accurately and rigidly |
| *Multiple Operation* TOOLS | Combine related operations speeding production and cutting costs. |


than a few years ago, and a lot more than a couple of decades ago. And that without production being smaller. On the contrary, it is now much larger; it isn't only new tools that have caused this revolution; the efficiency, and respect for accepted disciplinary rules are also included.

It is a good thing that Al and Ed cannot get by now with some of the things they have heard from oldtime foremen. Abandoning the rule "survival of the fittest," then practiced in its worst form, is not to be regretted.

As some foremen then abused their power to gain advantages to the detriment of those under them without any gain for their companies or their communities, the same thing might occur again if any privileges are granted for this group of men. They might be so many in proportion to the total space available, that it will force a large part of the others to park their cars on the streets—perhaps far from the factory or shop. If the parking space is too small the foreman should have to park on the streets too.

Democratic principles are not something handed to us, which we just have to accept. These principles must also be protected and defended if need be in all walks of life. So I suggest that all workers and staff members without reserved parking spaces tell the management to adhere to the democratic principles at stake in this issue.

Of course, there is nothing wrong with having a reserved parking spot for the foremen if all the other groups also get their spots. But if only the foremen have parking lots for themselves and none of the others, it must be classed as undemocratic. Reserved parking spaces used to be marked out for guests and business friends only, but not for particular groups in any organization. And if high brass knows what's going on

*"It's just a good thing that was really a chocolate cigar you were chewing on, or I'd have had to fire you."*

**BIG PARTS**—Sterling Engine Company checks surface finish on crankshafts, camshafts, milled surfaces, gear teeth, and other work with the SURFINDICATOR. It's portable and can be used right on the job!

## "SURFINDICATOR—*Eliminates arguments on surface finish!*"

"ALTHOUGH IT IS DIFFICULT to estimate the savings made possible with gaging equipment," states Sterling Engine Company, "we have realized definite dollar savings with the Brush SURFINDICATOR* just through the elimination of arguments." Sterling uses the SURFINDICATOR to check finish on many precision parts where a microinch finish is specified.

The SURFINDICATOR speeds inspection, saves time, and can help *you* eliminate costly overfinishing. It can be set up easily for operation by shop personnel. Write for booklet—or ask for a demonstration of the SURFINDICATOR in your plant. Brush representatives are located throughout the United States. In Canada: A. C. Wickman, Ltd., Toronto.

*Trade-Mark

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INDUSTRIAL AND RESEARCH INSTRUMENTS
PIEZO-ELECTRIC MATERIALS • ACOUSTIC DEVICES
MAGNETIC RECORDING EQUIPMENT
ULTRASONIC EQUIPMENT

*formerly*
*The Brush Development Co.*
*Brush Electronics Company*
*is an operating unit of*
*Clevite Corporation.*

**SMALL PARTS**—Chance Vought Aircraft, Inc. checks interior smoothness of fuel valve poppets used in the Cutlass jet fighter with the Brush SURFINDICATOR. Interior surfaces are measured with aid of small-bore pickup.

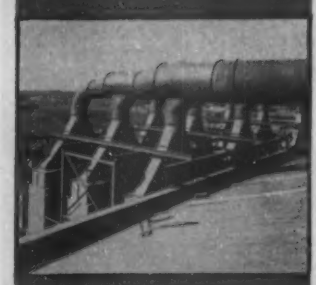
**BRUSH ELECTRONICS COMPANY, Dept. U-11**
**3405 Perkins Avenue, Cleveland 14, Ohio**

☐ Please send free copy of "Surface Finish Control."
☐ Have your nearest representative demonstrate the SURFINDICATOR to me.

*Name* _____
*Position* _____
*Company* _____
*Address* _____
*City* _____ *State* _____

# More than 10,000 Words-

**the photographs here show more than any number of words the immensity of this installation by Peters-Dalton of a Dust Collection System.**



Peters-Dalton has recently completed the installation of Dust Collection Equipment in a major automotive plant. The undertaking, as illustrated, was mammoth and results obtained have justified our claim that Peters-Dalton can design, build, and install outstanding systems.

Peters-Dalton efficiency, backed by 25 years of intensive experience, is coupled with our great manufacturing capacity and engineering skill. These factors insure such results as are to be found in this installation, which is among the largest ever built. Literally, miles of ducts were used here to make efficient collections from machine operations via up—over—and—along roof top installation through ducts as huge as 11 feet in diameter.

Whatever your dust collection problem is, whether for product recovery or nuisance dust—even corrosive material, wet or dry—we invite your inquiry. ***Just write, wire or phone.***

- ***Hydro-Whirl Paint Spray Booths***
- ***Industrial Washing Equipment***
- ***Drying and Baking Ovens***
- ***Hydro-Whirl Dust Collecting Systems***

PD Peters-Dalton INC.

17633 Ryan Road — Detroit 12, Michigan


in the minds of their employees, they should not themselves demand such privileges.

A few years ago I visited a large factory in Baltimore, Md, and the export manager took me around the whole city in his car. On returning he said, "I think I'll park the car on the reserved spot, you being our guest." Even he didn't have the right to use the reserved spot for his car when he drove it without visitors. This, I think, was something to learn from.

If any company wants to reserve parking space for its foremen and some of them don't come, there'll be valuable spots not used, which must be wrong when there is too small a space available for the purpose. And, even if a reserved space for the foremen doesn't give them any excuse for not being in on time, some will abuse this rule anyway. All foremen should be among the first to arrive at their place of work.

If Perkins got a big head due to this offer, thinking thereby the foremen would get parking privileges, he is certainly a pompous ass. It is Perkins' duty to take his job seriously even if there are no privileges involved. When a company offers its foremen parking privileges, nobody can blame them for accepting, but such favors should not be taken advantage of in a bullying manner. I believe Ed is right when he says that it wasn't too many years ago when the foreman was almost as important a character as the plant manager, and put on plenty of airs too. Upton Sinclair and John Steinbeck have proven that in their books.

And if the foremen's reserved parking space also carries with it the idea that Ed and Al must protect their social standing by buying new cars, there is another argument against the arrangement.

A foreman should nowadays never try any type of arrogance to make himself important. It won't do him any good. There are always some men in his crew that'll look on him with pity if he does. Some men in any working force are always equal to or smarter than their foreman. He'll gain more if he does his duties in an air of cooperation rather than practice any kind of supremacy. If anybody tries to backtrack him for such reasons he has means at hand to defend himself.

If the foreman today cannot use the same brutal methods as years ago, and has changed mentally, so have the workers. The skilled craftsman of our times is much more enlightened than a couple of decades ago. He knows his duties, his rights,

and responsibilities and won't abuse, but respect any democratic principle used by his foreman.

Al's objection to Perkins' put-on show is perfectly sound, and Ed will never live to see the return of the foremen's oldtime glory.

A E Fristedt
*Stockholm-Bromma, Sweden*

•

NOONTIME COMMANDOS

*How much importance should be attached to noontime activities? Is strenuous activity more likely to absorb excess energy, or cause a later serious letdown?*

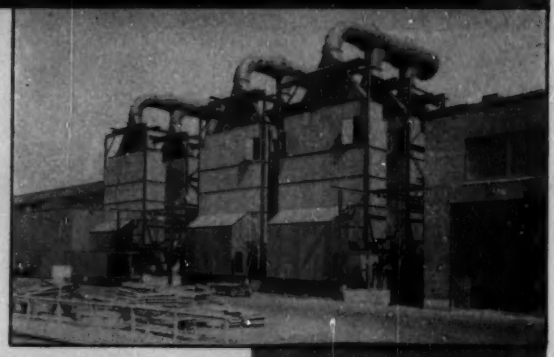
SAY, AL, do you happen to be one of these cantankerous old buzzards who has never received a kick out of life, or are you one of these free-enterprise poker faces whose heart is made of cold steel! Now be honest, Al,—didn't you spend a few minutes of your noon time, when you were full of zip and vinegar, doing something different from your regular work so as to gain a little relief from the monotony of that daily drudgery?

There is nothing like a little activity at something different from regular work to make the blood race to the extremities and invigorate the whole system to a new feeling of joy and contentment. If one wants to grow into one of these cold, gray, cadaverous robots who goes about his work with a humped back and round shoulders, then let him loll around during his noon hour and mope. Get the lead out, you loitering skeleton, and make the most of your idle noon-hour moments by participating in some form of sport. You'll do yourself as well as your employer good

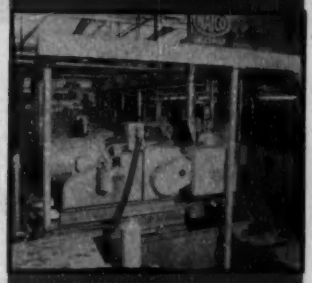
*"It's . . . heh, heh . . . a new tech manual, Boss! Done in comic book form of course!"*


More than 10,000 Words-

would be needed to tell the complexities of this Aeroturn Dust Collection System by Turner-Haws.



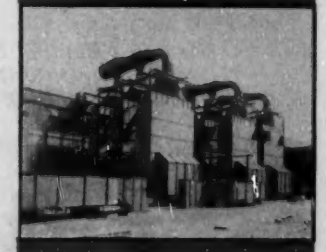
A major automotive manufacturer has recently installed a highly mechanized division. The machining operations performed here demand an exceptionally efficient Dust Collection System.



Pin-point efficiency was required for these huge Aeroturn Dust Collection Units. 99.9% air cleaning efficiency is attained by filtering out airborne particles of all sizes down through the sub-micron range. In addition, the cleansed air is returned to the plant, saving heat and cooling expense.

The fully automatic filter cleaning provides continuous operation of the collecting system with no shut-down time. Maintenance costs are negligible.

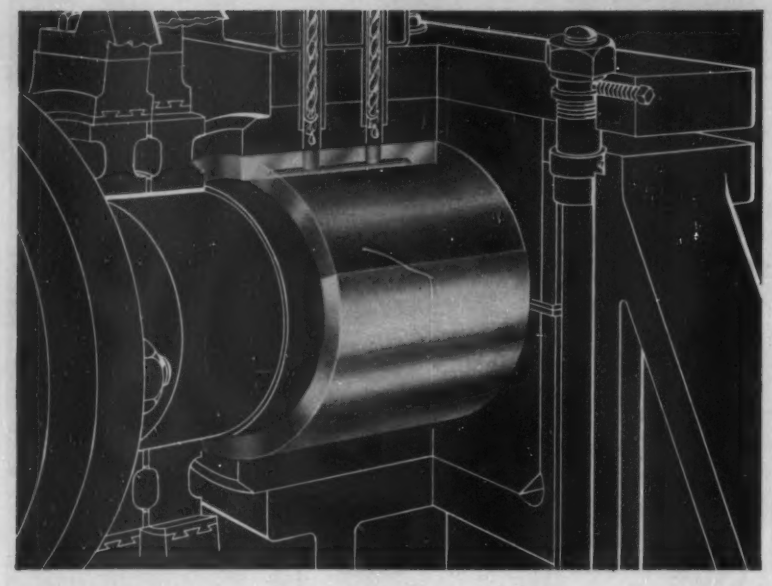
For a huge installation such as the one illustrated here, or for one of moderate dimensions, Aeroturn Equipment offers another most important feature —it occupies only 1/3 to 1/2 the space required by other types of collectors with comparable capacity.



*We cordially invite your inquiries— Just write, wire or phone.*

AEROTURN
DUST COLLECTORS

TURNER & HAWS
ENGINEERING CO., INC.



THE WAY TO CUT...

*Cost of replacement*

Any bearing, regardless of type, may one day reach the point where it requires replacement. If this point is reached the replacement of a sleeve bearing is far less costly than the replacement of any other type of bearing.

Disassembly and removal of the original bearing, installation and reassembly with the new bearing are simpler, quicker and therefore less costly and the cost of the sleeve bearing itself is moderate compared to the cost of other types.

The user of equipment which you design and build will appreciate these advantages of a sleeve bearing.

*There is a Bunting Engineer near you. Consult him. Or write our Product Engineering Department at Toledo.*

**Bunting®**

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

**The Bunting Brass & Bronze Company • Toledo 1, Ohio**

Branches in Principal Cities • Distributors Everywhere

if you do, and the mortician will have to wait a little longer before he puts you through the pickling process.

I don't see where Al gets the idea that noon-hour activities are detrimental to the interest of the firm. A healthy employee is money in the bank to the boss. Surely he wouldn't wish to have the men grow into a bunch of weaklings. If I am not badly mistaken it seems to be the policy of management to do whatever it can to promote the general welfare of its employees—I'm referring here to employers who are broad-minded enough to see what is necessary to make a plant pay. Naturally one will find a few whose vision is so cluttered up with the idea of making money the hard way—the way in which time will finally rob them of all they think they can gain by greedy methods.

The practice of having the workers spend their noon hours sitting on a bench while they eat their food from dinner buckets is no longer advisable. This might suffice where only a half hour is allowed, but the modern trend is to provide the employee with more leisure time. This idle time is no good for him unless he puts it to constructive use.

What constitutes constructive use? It isn't to have the worker go out on a lot and run himself ragged playing ball even though he does get a kick out of it. It isn't at all fair for a man to race around, getting himself overheated, and imposing an unnecessary strain on his heart, then making a mad dash to beat the starting bell and expect to do some useful work.

The noon hour is the worker's to use as he sees fit, but he should be able to see clearly wherein his rights end and where justice to his employer begins. If he uses his time carelessly it is up to management to complain and he certainly is justi-

*"So when he said, 'Want a job where you'll really clean up' naturally I assumed——"*

# Keller Multiple Nut Setters

*achieve*

## ACCURATE TORQUE CONTROL and FAST RUN-DOWN

**on multiple nut setting operations in the 4 to 140 foot-pound torque range.**

**From the bolt pattern on your own blueprint**

**. . . a tool design that meets your needs**

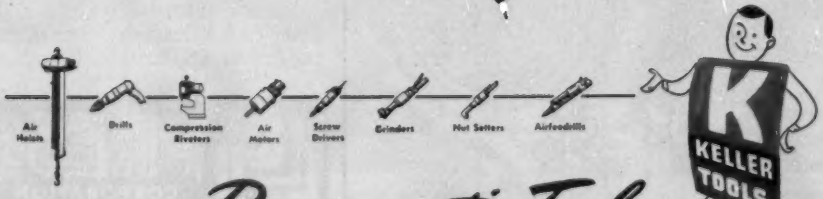
**. . . and a complete Multiple Nut Setter built up with standard unit assemblies**

Do you have a nut setting problem involving a reduction in time or the maintenance of accurate torque control in setting two or more nuts? Then let our field engineer show you how Keller Multiple Nut Setters can solve this type of problem.

On your own blueprint of the job, he will lay out the complete tool—showing size and location of motor units and handles, and an outline of the mounting plate.

From this layout, Keller builds up the complete Multiple Nut Setter from standard units (only the mounting plate is special). You have a tool engineered to your specific job—with economies gained from standard unit construction.

For catalog information, ask for Bulletin No. 12.

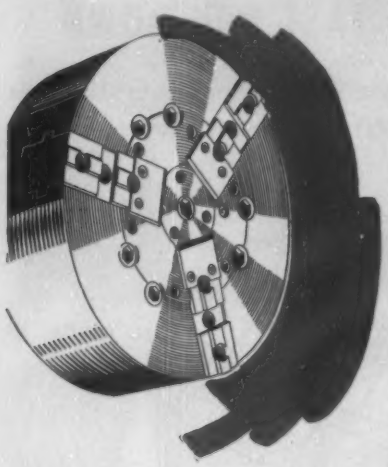


**KELLER TOOL COMPANY**
**1303 Fulton Street**
**Grand Haven, Michigan**

**KELLER** *Pneumatic Tools*

# SKINNER

## precision POWER CHUCKS



## accurate • fast safe • dependable

*"with power to push production"*

Available from 6" to 24" with forged steel bodies, and with 2 or 3 adjustable, non-adjustable or serrated jaws. Double-acting rotating and non-rotating air cylinders available for all chuck sizes and for actuating all types of holding fixtures and tailstocks.

Write for catalog describing the complete line of Skinner power and manually operated chucks and accessories. Ask for movie "Chucks and Their Uses" for free showings.

See them at the Skinner Booth — No. 1808 ASTE Show

THE CREST SKINNER CHUCKS OF QUALITY

THE SKINNER CHUCK COMPANY

203 Edgewood Avenue, New Britain, Conn.


fied in doing so. We cannot say to a man: "Now, Bill, when you go out there to play ball at noon, do it in moderation because it isn't fair for you to get yourself all overheated and nervous." He's likely to say: "You're tellin' me what I should do on my own time—to hell with you." It is as much the duty of the worker to see that what he does affects his efficiency as a worker as it is the employer's right to desire that the worker turn out his work in the least possible time. It is incumbent upon the employee to do what he can to maintain the best of health. This is the prime consideration when rating the value of the worker.

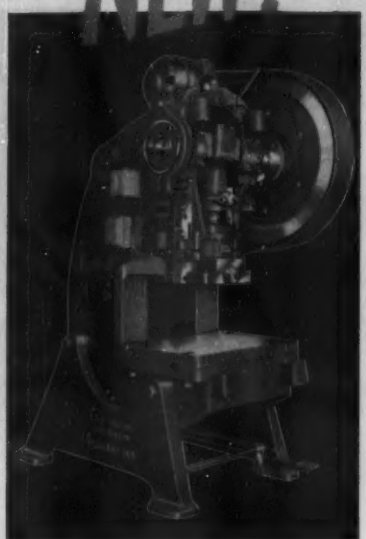
If, when a worker is warned that careless use of his noon hour will affect his status as a dependable employee, he continues to ignore the admonition, then good riddance to someone who can readily be replaced by one more worthy.

Frank Van Horn
*Auburn, Calif*

RELAXATION can come in many forms. While it is true that a too-strenuous program could wear out an individual and thus keep him from being able to produce efficiently, the reverse is also true. The person who never changes his thinking or action—who always sits at his machine ready to start it up again and make big production—is not always the man who accomplishes the most. It may appear to the casual eye that there is a man who is going places, a person who constantly applies himself to the work at hand and never goes in for frills or noontime games, or for any other type of relaxing program. But sometimes this type of person wears out. Always his efficiency is lower than the others, but

*"Fastest milling-machine operator we ever had around here—does the work of 3 men."*


# NEW!



## 65-ton L&J Press

Here's the new No. 6 press that gives you more value through features that insure efficiency and low production costs.

The heavy, rigid frame holds deflection to a minimum for greater accuracy and longer die life. Extra depth of throat adds versatility. Replaceable bronze bushings for main and upper ram bushings. Buttress threads on ram screw and replaceable hard bronze ball seat. Roller bearings in flywheel or main gear and backshaft mountings. Long, precision-scraped gibs maintain alignment and accuracy. Air clutch available. Also made in back-geared model.

SPECIFICATIONS

| | |
|---|---|
| Strokes per minute | 85 |
| Ram stroke, standard | 4" |
| Max. stroke (to order) | 7" |
| Throat depth | 13½" |
| Die space, standard* | 13" |
| Special,* up to | 19" |

*bed to ram, stroke down, adjust. up

Contact our local distributor for complete information. Also, 16 other O.B.I. models—6 to 80 ton capacities. Or, write for literature.

L&J PRESS CORPORATION
1629 STERLING AVENUE
ELKHART, INDIANA

any way you look at it

# SIMONDS grinding wheels for CYLINDRICAL GRINDING give top quality, low cost production

**Surface finish as you want it! Fast stock removal! Lasting wheel action that holds up on corners and maintains radii. That's the kind of efficiency these wheels deliver on traverse or plunge-cut cylindrical jobs. Send for catalog bulletin ESA-191 and name of your nearest Simonds Abrasive Distributor.**

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PHILADELPHIA 37, PA.

**BRANCH WAREHOUSES: BOSTON, DETROIT, CHICAGO, PORTLAND, SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES**

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. • OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUEBEC AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUEBEC

# 8 REASONS WHY...

## Lovejoy Cutters are your best buy!

Lovejoy milling cutters offer eight important advantages which help you achieve maximum accuracy, dependability, production and profit from your milling machines.

1 All Lovejoy cutters are insert-tooth type. This means high body strength, plus maximum blade hardness. Only worn out blades need be replaced—*not* the entire cutter.

2 Serrations are on the front of each blade — the plain back makes full contact with the body.

3 Positive-locking device on blades assures complete rigidity, even on heavy intermittent cuts.

4 Advancing, replacing and sharpening of blades is fast and accurate, keeps down-time at an absolute minimum.

5 Extra rugged blade and body design assures maximum results on modern, high-speed millers.

6 H. S. S., alloy and carbide-tipped blades are available promptly from stock.

7 Lovejoy design is tops for blade interchangeability in practically all cutter styles and sizes.

8 Lovejoy has had 35 years of experience in designing and manufacturing standard and special cutters for the country's leading manufacturers—our background can help you get best results from your milling operations.

*Write for free catalog!*

128 MAIN ST., SPRINGFIELD, VERMONT

**LOVEJOY**
**TOOL COMPANY, INC.**


to all appearances he is the driver, the slave, and the individual who just keeps plugging.

Trends change, and so do one's ideas of things in general. We sometimes are fooled by the gilt and glisten of the paint into thinking it is real gold. While we all do not enjoy baseball as a game to be played at noon, we all must find some way to relax. The game of baseball will relieve tension. Many who play are only giving vent to action which their normal work does not supply. They are using up excess energy which must be released or relaxed in order that they may more efficiently think or handle their normal work.

It is true that anything can be carried to extremes. Any over-emphasis on "play" can also make Jack a dull boy just as quickly as "all work and no play" can. We in this country like extremes. We never seem to be able to walk the narrow path without straying. So it is with play. We go to extremes and too often spoil the good which it can bring. Therefore, we see planned programs for relaxation—programs started and guided to help our workers enjoy everyday working hours. Our society today has grown to where we must spend two-thirds or more of our life going to work, working, returning from work, and sleeping. Somewhere we must get the needed relaxation. Not definite rest perhaps, but change in pace, a change in thinking and action. We must have our relaxation, but we must not let noon-day athletics sour our thinking on such programs. All of us do not like the same things. Those fellows out playing ball at noon probably think that you who are active

*"Let's see a great big smile, first."*

all during the working period and who like to relax by sitting down talking to others are wasting your time.

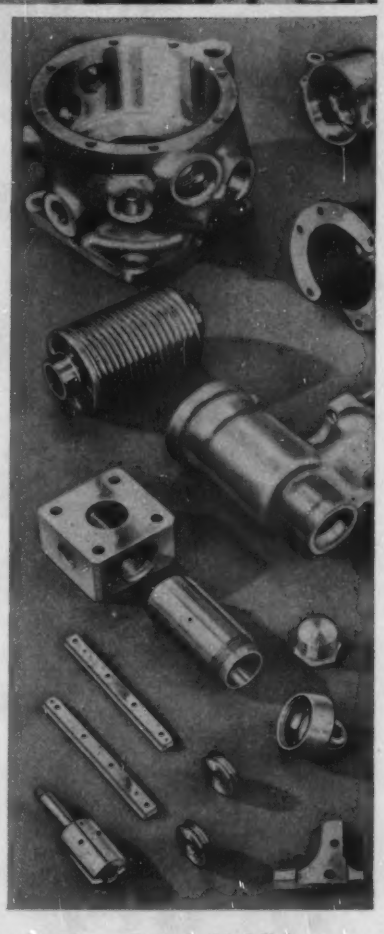
How many times have your bull sessions run overtime? How often do you get to work the moment the bell rings? How often do you feel exhausted after lunch? Probably the answers will be about the same for the group of ball players. Our efficiency is due to many and varied things. Combinations of these can produce results; other groupings can result in a lower efficiency during certain periods of the day. We are not mechanical robots, thank goodness, and we all do not react in the same way. However, we all are human beings and the pattern of our output curve is similar. Regardless of what we do, the curve follows the same shape—perhaps at a higher or lower level. These levels of productivity also will change with company policy, surroundings, and management. It is all-important in our growing mechanized industrial world to place at the disposal of our great masses the best conditions, the best chances for relaxation, in fact the best of everything. We can never hope for the ultimate, but we can certainly make it possible to aid our workers to enjoy themselves while giving their time to building our industrial giants.

We depend upon harmonious relations with our workers to make the world go round. Lets start at home to see that each company has available for those who want it—chances for relaxation at noon. Baseball, yes, or any other form of play. We nearly all love some form of sport. Some like to talk, others to read, so don't pick out one group. Also, don't consider that this form of play is hurting production. Remember today most of the workers are employed on some type of incentive system. What they do is reflected in their pocketbook. A too-greedy company will not succeed. It is the companies with good, sound thinking, and a planned work and play program that are going ahead.

Charles D Townsend
*West Hartford, Conn*

THERE WERE 790,426 PATIENTS throughout the nation under treatment in our mental institutions as of Dec 31, 1950. There has been a steady increase in such patients, about 11,000 per year, during the past twenty years. These figures are from the 1953 US Statistical Abstract.

We should all make an effort to eliminate some of the causes which



You can depend upon Vinco production specialists to mass produce precision parts to your specifications the same as you depend upon a pharmacist to fill your prescription.

Facilities in the production plant at Vinco are set up to mass produce parts rapidly and inexpensively from ferrous and non-ferrous metals. Personnel is skilled in operating the automatic and semi-automatic equipment. An efficient quality control system is based upon a completely equipped inspection laboratory.

You save both time and money because Vinco made parts are within specified tolerances, thus assuring proper assembly.

Have Vinco produce component parts for you and learn why a specialist is your best bet.

VINCO CORPORATION, 9125 Schaefer Hwy., Detroit 28, Mich.

**Metal Component Parts Mass Produced • Aircraft and Commercial Gears • Model B-1 Dresser • Precisiondex • Spline Gages Master Gears • Gear Rolling Inspection Fixtures • Camshaft Comparators • Optical Master Inspection Dividing Heads • Involute Checker.**

**TRADEMARK OF DEPENDABILITY**

**VINCO** ®

MILLIONTHS OF AN INCH FOR SALE

contribute to mental instability. The opportunity to relax, to escape boredom, to enjoy the companionship of others will help.

The noontime athletic period in industrial plants aids in the creation of a sound mind in a sound body; it will also improve employee morale and result in greater productivity per man-hour.

Men who can play together can work together. Men who work together accomplish more. They excite and activate one another. They accord personal recognition to one another. This creates a sense of importance, a feeling of belonging, in the worker. The man becomes distinguished from his work.

An opportunity to forget one's problems, even momentarily, is a valuable safety valve. The release of mental pressure is good for the mind of a man. A few innings of noontime soft-ball, for instance, is something to look forward to. It is a refreshing break in what sometimes can be a long eight hours. It is a pause which makes the worker a man, and the man a better worker.

The value of the play period is well known to the management of both small and large enterprises. I once worked as a heat-treat boss for a small concern. Weather permitting, we had a noontime ball game. Being a player of some little experience, I got into the act. The shipping clerk allowed me to play on his team.

A lad named Johnny also played on our team. Johnny was an able, but a hard-to-get-along-with guy. He was slow and not very careful about following instructions. After the game one day, I inspected a furnace which Johnny had loaded in his usual slipshod manner.

"Johnny," I said, "you played a great game today. We sure are lucky to have a player like you on our team."

"I sure tagged that one today," replied Johnny.

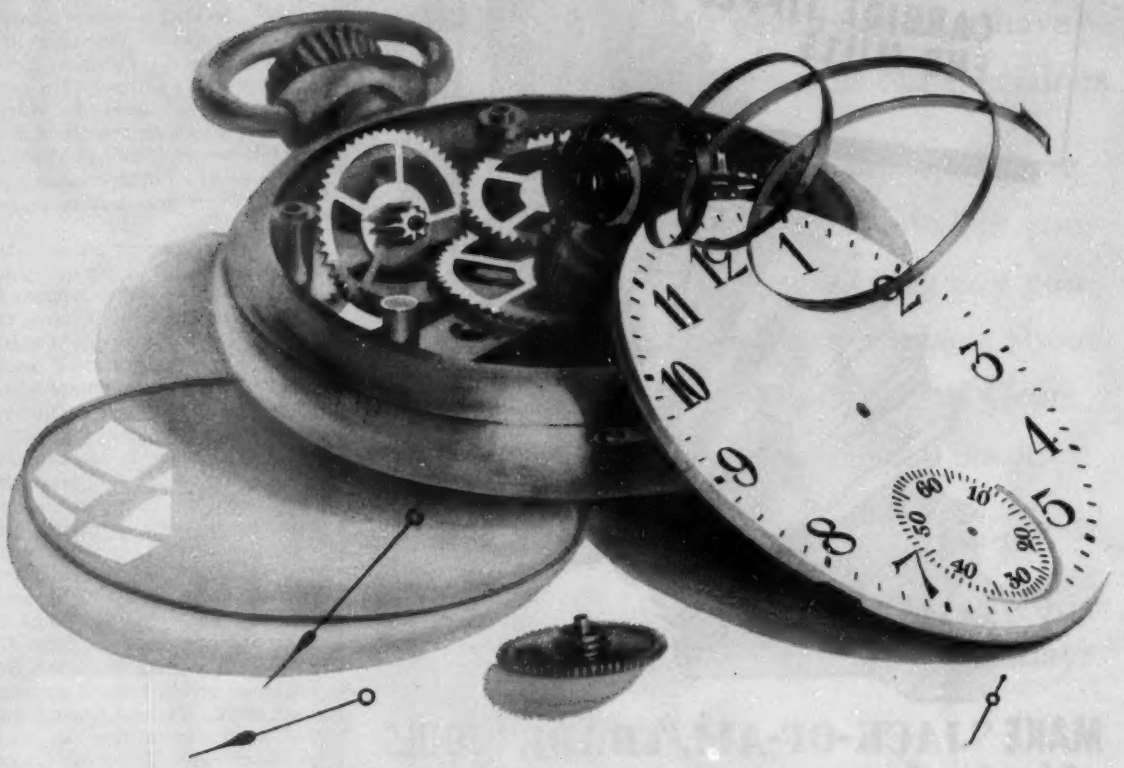
"You sure did, Johnny," I interrupted. "I wish you could load a furnace as well as you can hit. Why don't you put bricks under those castings so that the heat will circulate under them more freely? And put a pier of bricks under that arch, —just in case it has a tendency to sag during the cooling cycle."

"That's being a little too fussy isn't it?" asked Johnny.

"Maybe so," I answered, "but a good ball player like you pays attention to the fine points of the game. A good heat treater never misses a trick to do a better job either, Johnny."

"Maybe so," Johnny repeated.

# *Everything a watch should have*
## *—except the tick!*



**Your plant can't "tick" properly, either—without Correct Lubrication!**

Like this watch, your plant may have all the right "parts"... the finest machines made... yet may not be "ticking"—running at top efficiency—because something is lacking. That "something" is called *Correct Lubrication!*

By Correct Lubrication we mean much more than just "oil" and "grease"—which any oil supplier can provide. We mean a detailed *program* of lubrication—designed specifically for your kind of machinery and type of operation.

Working with your personnel, we analyze all your machines and their operating conditions to determine their exact lubrication requirements. Then we recommend the *right* Gargoyle product for every moving part, advise on correct methods of application, set up proper lubrication schedules, follow up regularly with progress reports on benefits achieved.

In plant after plant, such a program has effectively boosted production—materially cut maintenance costs. It can do the same for you. Why accept less?

*Socony-Vacuum*

SOCONY-VACUUM

*Correct Lubrication*

FIRST STEP IN CUTTING COSTS

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

# MAKE "JACK-OF-ALL-TRADE" TOOLS *Obsolete!*

174 different end mills — in diameters varying from ¼" to 5" — with 2, 3, 4 or 6 flutes — and straight or taper shank — make Nelco the line with the widest selection of standard sizes!

On every application, every material — there's a specific Nelco end mill in stock designed to do the job — and do it better, quicker and at less cost than it's ever been done before! Here are the facts to prove this astonishing statement:

Specific rake angles are engineered for each individual tool to guarantee maximum performance and life!

Selection of the hardest practical grade of carbide for each end mill makes available from stock the most efficient tool to do your specific job!

All Nelco End Mills are spiral fluted for easier chip clearance, finer finish and superior tool performance.

All taper shank end mills are available with detachable tang for interchangeable draw bar or tang drive use.

Eliminate "jack-of-all-trade" tools! Select a Nelco End Mill from stock, engineered to save hours and make dollars for you! Call the Nelco distributor in your vicinity and send today for your free copy of the new 48-page Nelco catalog.

NELCO TOOLS *For that Extra Edge in Production*

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT


"I'll tell you what, Johnny," I went on, "you give me some tips on hitting and I'll give you some tips on heat treating."

"That's a deal," responded Johnny, "I'll go along with that."

And he did.

These noontime ball games developed a closer association, a more friendly feeling, between the bosses and the workers. Efficiency in the shop increased. Furnace capacity was more fully utilized. The quality of the work improved. Work-in-process cycles were shortened. Everyone felt better. Meeting competition, operating at a profit, became a little easier. There was less pressure all around.

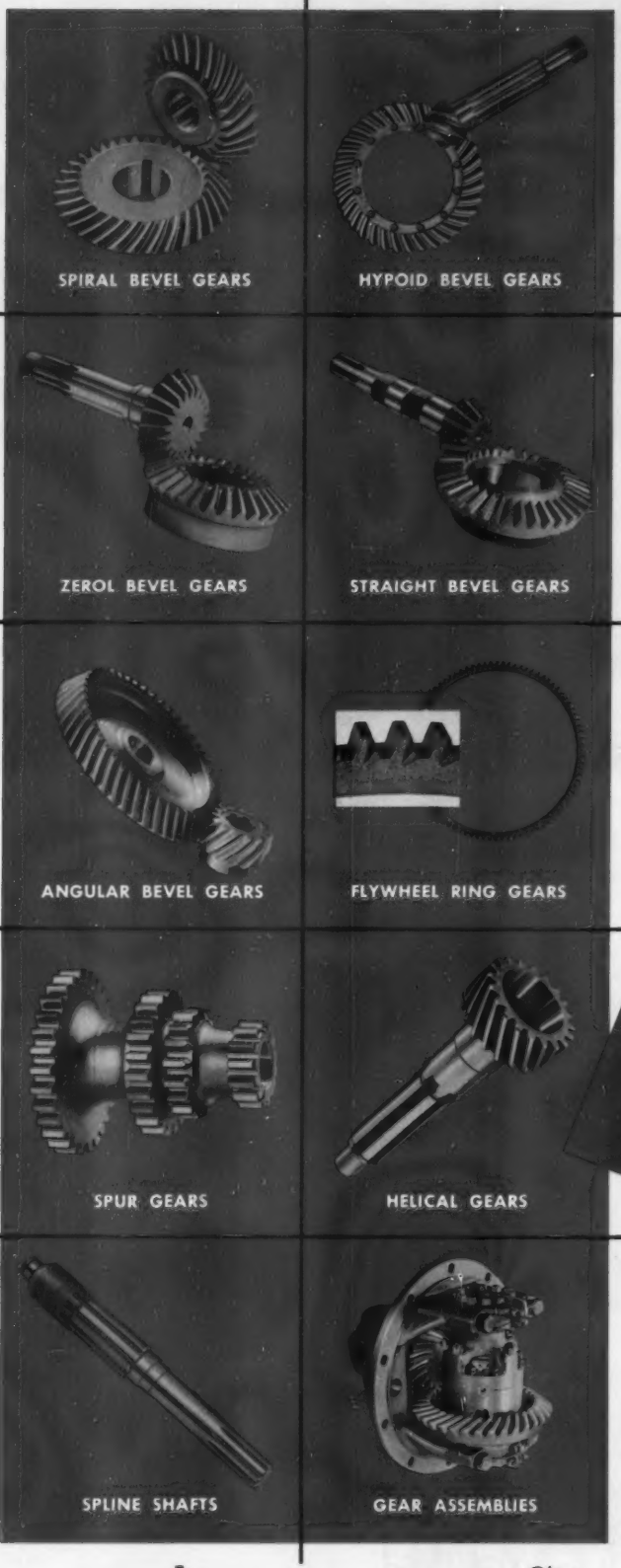
Large corporations are also strong supporters of all group activities of their employees. They seldom miss an opportunity to build up a much desired esprit de corps. Industrial plants have their athletic associations, bowling leagues, hard and soft ball teams; golf and tennis clubs fluorish. They all have, to say the least, the strong moral support of management. Bocce ball, horse shoes, and catch are common noontime activities in large industrial plants.

I have never known a noontime athlete, herein called a commando, to wear himself out. He returns to the job cheerful and refreshed. Furthermore, sportsmanlike competition develops a sterling character. Every workman prides himself on being a good sport. Winners become generous; losers learn how to take it philosophically. Tomorrow is always another day. Winners and losers have that which is rarely found in a mental institution, an optimistic smile.

Give your employees a chance to relax, to let off steam, to be themselves. Mental strains are well worth relieving, if only to transform them into physical aches. Noontime commandos are a smiling, happy, carefree lot. Patients in a mental hospiptal are not. Endorse the noontime athletic program.

Peter A Seward
*Swampscott, Mass*

THE EFECTIVENESS OF NOONTIME ATHLETICS is somewhat dependent upon the intensity with which it is carried out. Noon hour to me is a pain in the neck. I despise eating from a lunch box and in most of the shops I worked such things as cafeterias were not in evidence. I tried to make my old lady see the value of a good warm lunch but I was told in no uncertain terms that my presence at home at noontime was not desirable




Through 40 years of gear making, these are the 10 gear types that have emerged as our specialties.

If one (or more) of these types is included in your product, it may pay you to review the facts about Double Diamond Gears contained in this book.

We will be happy to send you a copy. Why not write for one today?

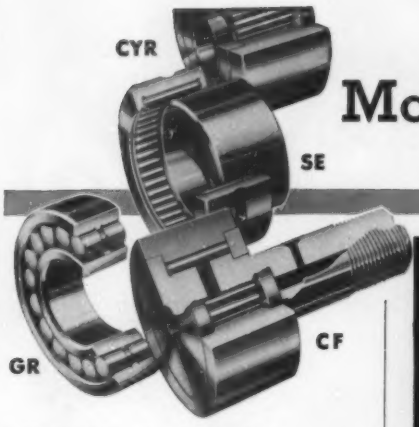
DOUBLE DIAMOND TRADE MARK GEARS

FOR AUTOMOTIVE, FARM EQUIPMENT & GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

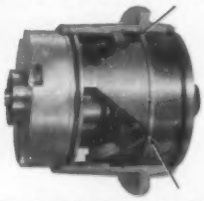
# Automotive Gear Works, inc.

ESTABLISHED IN 1914 RICHMOND, INDIANA

# McGILL BEARING BRIEFS

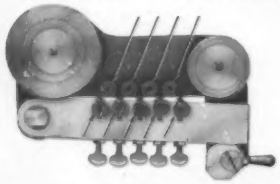



## MULTIROL CF BEARINGS PROVIDE POSITIVE CAM ACTION IN ANCHOR CUT-OUT

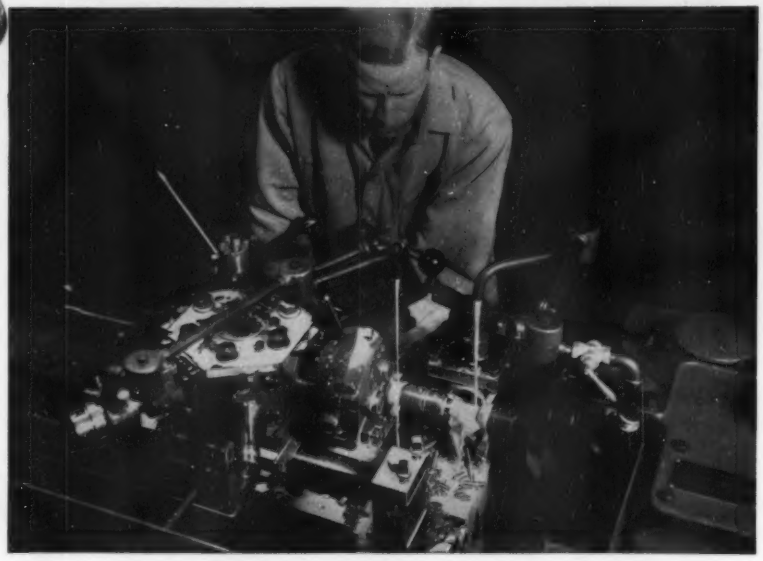


Anchor Steel and Conveyor Company relies on Multirol Cam Follower Bearings for positive and instant operation of Anchor cut-out couplings. When dangerous overload occurs this torque sensitive coupling cuts power when a spring loaded sliding sleeve is actuated by forcing CF series bearings up the inclined faces of a circular cam. Shock load capacity and dependability of CF series bearings combine to help the Anchor Company protect motors and machinery from damage due to overload.

## SJOGREN KILLERS CAST WIRE ON MULTIROL CF BEARINGS



On Sjogren Killers for casting wire, Multirol CF bearings with outer races grooved to required wire size have replaced hardened steel rollers. Sjogren maintained required accuracy at much higher casting speeds with minimum of grease instead of objectionable oil lubrication.



*Warner & Swasey Uses MULTIROL® CF Bearings as*

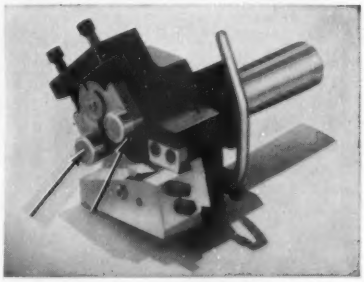
## STEADY REST ROLLERS ON TURRET LATHES

The precision turning done on Warner & Swasey Turret Lathes depends to a great extent on providing adequate, accurate and free turning support for the work in process. The pressure of the cutting tool must be backed up on the end opposite the chuck so that depth of cut and concentricity remains constant.

This support is provided with tool holders using two Multirol Cam Follower bearings as steady rest or bar turning rollers. The precision quality of these rolls is very important to efficient operation. Free turning rolls of adequate capacity will assure work with a smooth finish and a high degree of accuracy.

Warner & Swasey have been using Multirol CF Series bearings in this application for over 15 years. They adopted the McGill bearing after finding its precision quality, resulting from close radial tolerances, ideal to help insure superior lathe performance.

The outer ring of Multirol CF Bearings operates on a full complement of small diameter rollers so the load is



evenly distributed over a greater bearing surface. The inner race and flange are made in a single piece with the stud, preventing any possibility of disassembly. Close tolerance grinding of all bearing surfaces insures greater accuracy throughout longer bearing life and, compared with plain bearings, lubrication is simplified and less critical. Both starting and rolling friction are reduced to a minimum. As a result, internal wear is diminished and power requirements of Multirol bearing equipped machines are cut appreciably.

**BEARING SELECTION GUIDE**
A new 140-page Bearing Selection Guide, complete with 30 pages of vital engineering data, has been released by the McGill Manufacturing Co. Ask for Catalog No. 52.

McGILL® — **Precision Bearings**
**McGILL MANUFACTURING COMPANY, INC.**
**300 N. Lafayette Street, Valparaiso, Indiana**

as it interfered with the lady's schedule.

If it weren't for the rumblings of my weary innards I would much rather work straight through to five o'clock, but inasmuch as I am what I am—a peculiar sort of an individual who would rather work than eat—we cannot rate the value of nose-bag sports' effectiveness to the workers as a whole.

In my younger days—so long ago that I have to stretch my memory to the elastic limit in order to pin it down to definite dimensions—I aligned myself with the noontime commandos. I had the mistaken idea that I was a good pitcher and in order to make a showing I burned them over the plate, showering the batters and catcher with sudden bursts of dust and gravel more often than comfort to a dignified pitcher. My efforts to emulate our dear Rube Waddell of athletic fame did much to create enthusiasm among my teammates, but not my boss!

I was called on the carpet several times about the noon-hour playing, and needless to say I got sore about the intrusion on my rights. I'll admit that the hard-working pitching arm was not in the best condition to perform the delicate work I was doing for a good hour or more after the starting bell. From then on it was bla-bla-bla about baseball and finally wore down to regular work. The foreman and I had it out hot and heavy—he taking the stand that I should conduct myself during my noon hour so as to be fit for work and not to make a nervous wreck out of myself simply because I liked to play ball. I was naturally indignant that my freedom of action on my own time was being interfered with and spoke up like a true patriot.

As the golden years came upon me I have come to the conclusion that I was decidedly in error, and have since wondered why I was not kicked out of the shop bodily for having the ungodly brass to think that I could expect to do efficient work after going through those strenuous paces on the diamond.

It isn't a matter easily settled—this playing around at noon time. Workers have to relax, however, and in so doing will go overboard now and then in the effort to excel. It seems strange that one should put forth effort to relax, but it can be done if the matter is given a little thought. But this thing of tearing one's insides out after gulping down a sandwich or two is something that the employer should have something to say about. What's the use of giving the blood stream a spurt when

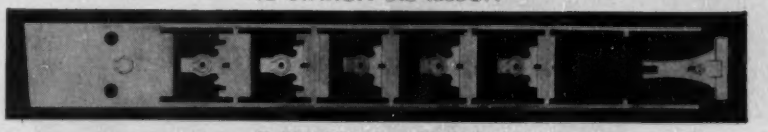

B. Jahn DIES PRODUCE

Every Metal Component of the Eversharp Hydro-Magic Razor!

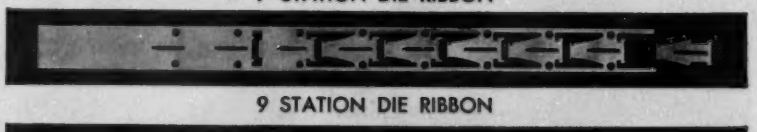
TO LESS THAN WHISKER-THIN TOLERANCES . . . WITH "PRODUCTION PROVED" PERFORMANCE AND ECONOMY!

Eversharp-Schick specified dies to mass produce a razor of superior quality . . . flawless operation . . . competitive price. Working against a tight schedule, B. Jahn evolved a series of progressive dies that turned out each individual metal component used in the razor! Every close tolerance was faithfully met — all specifications of die performance were adhered to — every requirement of product quality and accuracy was engineered and built into the dies by B. Jahn. To guarantee customer satisfaction, components were submitted to Eversharp-Schick for actual assembly line use before the dies were certified "PRODUCTION PROVED" and shipped!

12 STATION DIE RIBBON



7 STATION DIE RIBBON



9 STATION DIE RIBBON

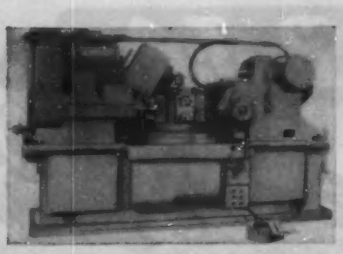
5 STATION DIE RIBBON 3 STATION DIE RIBBON 3 STATION DIE RIBBON

Send today for the fact-packed, picture story of "B. Jahn Production Proved Dies!"

B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

Here's what is meant by "1·2·3" in the GOSS & DE LEEUW AUTOMATIC CHUCKING MACHINE



The outstanding advantage of this machine is ability to handle operations on one, two or three ends of a piece simultaneously or in sequence, *without changing set-up* or rehandling. It is the only standard machine that will do this.

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence—a method exclusive with Goss & DeLeeuw and offered on this machine.

*For complete details ask for illustrated bulletin. Send samples of your work for time and cost estimates.*

GOSS & DELEEUW

QUALITY · PRODUCT · QUANTITY

**GOSS and DE LEEUW**

**MACHINE COMPANY, KENSINGTON, CONN., U.S.A.**


the nervous system is all shot to hell as a consequence?

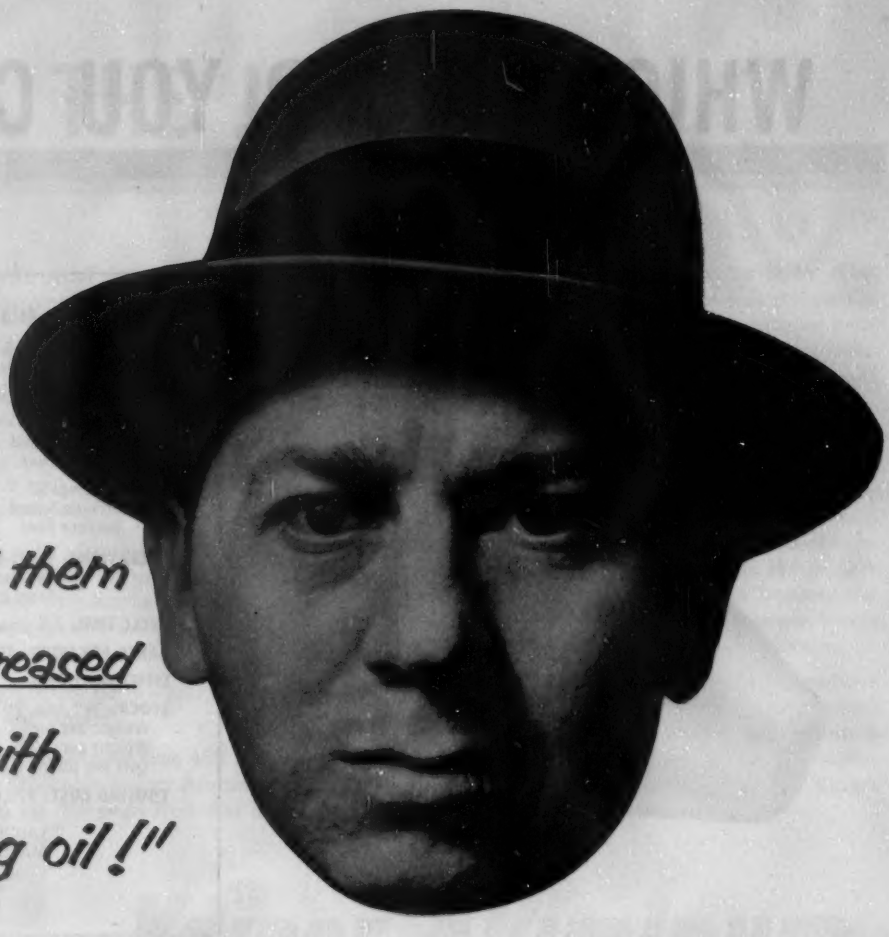
Take it from me, Mr Supervisor, and stick up for your interest by laying down the law pretty stiff for these two-legged grasshappers who thoughtlessly tear themselves to pieces on their own time and are unable to continue their work with efficiency. We wouldn't tolerate an employee coming to work in a drunken condition, and after over-indulgence in active sports one is in effect drunk with his nerves overtaxed to the breaking point.

Robert Roundbottom
*Laguna Beach, Calif*

As ED SAYS, you cannot stop the men from relaxing during the noon hour, but he should have added that baseball, football, catch, and similar games should only be permitted where a fenced-in area is available. There is nothing more disturbing to a smooth-running organization than allowing the men during noontime to play ball in the vicinity of parked employee cars with the resulting dents in various car bodies and cracked windows.

I know of one firm who lost a valuable toolmaker because the side of his car was dented by carefree noonday ball players. This man complained to the manager, stating that his car was parked in the space provided by the company for that purpose and then damaged because the company was allowing ball games in the immediate vicinity. The manager was quite indifferent about it, and said he had other things more important to think about than a lot of workers' cars, and if the man did not like the provided parking place, just as it was, then he should park his car somewhere else. This is exactly what the toolmaker did—for

*"Since Jay got his new store teeth he uses the lathe to eat corn off the cob."*



"We saved them time... increased tool life with one cutting oil!"

A large southern machine tool company and contract shop recently installed a 2½-inch, 5-spindle automatic screw machine on which different metals are machined every day.

Mr. Horace Lane, a Sinclair Industrial Lubrication Engineer, was called in to recommend a cutting oil that would perform equally well on brass, aluminum and steel. Mr. Lane reports, "It would have been impractical to drain 150 gallons of oil for each different contract job, so this machine needed a multi-purpose cutting oil – one containing both sulfur and lard for their wetting and anti-weld properties.

"From my past experience," Mr. Lane continues, "I recommended Sinclair SUPER WILKUT® which contains a balanced proportion of sulfur and fatty oil, in non-corrosive form, plus good heat-transfer characteristics. *Results were highly satisfactory!* Sinclair SUPER WILKUT saved time and money by eliminating frequent oil drains. It also helped to maintain close tolerances and prolonged tool life."

Why not let a Sinclair Lubrication Engineer help solve *your* lubrication problem. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N.Y.

**SINCLAIR CUTTING OILS**

# WHICH WOULD YOU CHOOSE

## Manufacturing data and costs—ALUMINUM

**MACHINE:** Browne & Sharpe, Model OG (Chain drive)

**OPERATING DATA:** (this job)

**Turning:**
Spindle Speed . . 4230 rpm (forward)
Surface Feet . . 450 per minute

**Threading:**
Spindle Speed . . 855 rpm (forward)
Surface Feet . . 85 per minute

**OPERATIONS:** Index-die on-index-feed stock-index-center-index-drill-index-drill, form and cut off.

**CYCLE TIME:** 7.5 seconds

**PARTS PER HOUR:** 480 (max)

**EFFICIENCY:** 79%

**STOCK:** ⅜" hex, 2011-T3 (11S-T3) aluminum
Weight per foot . . . . . .148 pounds
Weight per 1,000 pcs. . . . 10.66 pounds
Cost per pound (103 lbs.) . . . . $.788

**TOOLING COST:** $20.00

| | |
|---|---|
| SET UP . . | $ 1.60 |
| LABOR . . | 13.40 |
| MATERIAL . | 8.40 |
| | $23.40 per 1,000 in lots of 10,000 |

## Manufacturing data and costs—BRASS

**MACHINE:** Browne & Sharpe, Model OG (Chain drive)

**OPERATING DATA:** (this job)

**Turning:**
Spindle Speed . . 4230 rpm (forward)
Surface Feet . . 450 per minute

**Threading:**
Spindle Speed . . 855 rpm (forward)
Surface Feet . . 85 per minute

**OPERATIONS:** Index-die on-index-feed stock-index-center-index-drill-index-drill, form and cut off.

**CYCLE TIME:** 7.5 seconds

**PARTS PER HOUR:** 480 (max)

**EFFICIENCY:** 79%

**STOCK:** ⅜" hex, free machining yellow brass
Weight per foot . . . . . .45 pounds
Weight per 1,000 pcs. . . . 32.4 pounds
Cost per pound (324 lbs.) . . . . $.502

**TOOLING COST:** $20.00

| | |
|---|---|
| SET UP . . | $ 1.60 |
| LABOR . . | 13.40 |
| MATERIAL . | 16.26 |
| | $31.26 per 1,000 in lots of 10,000 |

**COST OF NOZZLE PER 1,000 IN LOTS OF 10,000**

| | |
|---|---|
| IN BRASS . . . . | $31.26 |
| IN ALUMINUM . . | 23.40 |
| SAVINGS PER 1,000 . . . . | $ 7.86 |

**OVER 24.9% SAVED ON THIS ONE PART!**

# TO GET THE JOB?

ON THE opposite page is more proof that you can quote far below competition when you figure jobs in aluminum. And here's why:

- A pound of aluminum gives you up to three times more feet of stock than a pound of brass or steel. *Three times as many parts!*
- Aluminum may permit you to reduce machine time; eliminate plating; extend tool life; and gives you a ready market for recovered scrap.
- *Better* parts can result with aluminum because it gives you a unique *combination* of advantages, including lightness combined with strength, handsome finish, corrosion resistance, good heat and electrical conductivity.

To cut your costs . . . to get better parts—and thus get more jobs—*always bid in aluminum!*

**Valuable information is available now** that will make it easy for you to use more profitable Kaiser Aluminum screw machine stock. Send for 165-page Rod, Bar and Wire Product Information Book. Also, write for Rod, Bar, and Wire Wall Chart on Weights and Availabilities. For this literature, at no obligation, write on your company letterhead to: Technical Editor, Kaiser Aluminum & Chemical Sales, Inc., 228 N. La Salle, Chicago, 11, Illinois. (For others wishing the Product Information book for a personal library, the price is two dollars per copy.)

**If you are already machining aluminum,** call a Kaiser Aluminum sales engineer or your nearby Kaiser Aluminum distributor for immediate assistance in obtaining aluminum stock for your specific needs. We believe we are ideally equipped to work with you, because our efforts are put behind the job of serving manufacturers—to help improve their products and reduce costs.

**Look for our local number** in the classified telephone directory under the heading "Aluminum," or contact one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois; *Executive Office,* Kaiser Bldg., Oakland 12, California.

**Kaiser Aluminum**

**setting the pace—in growth, quality and service**

## HERE'S HOW EASY IT IS TO MACHINE ALUMINUM!

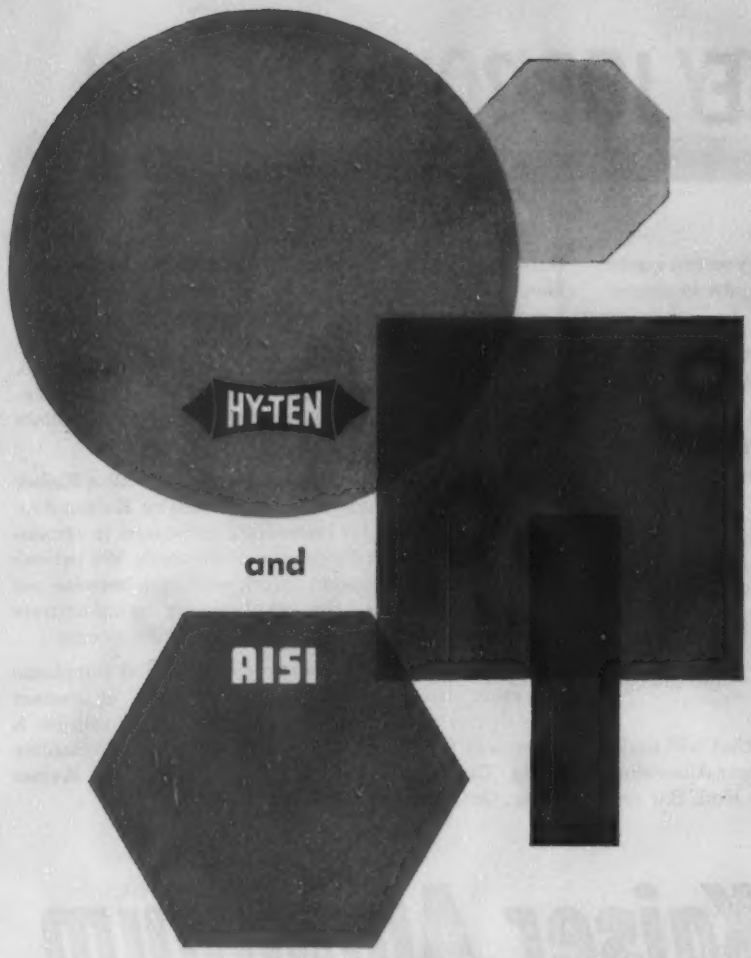
More and more experienced operators have found that a few basic considerations are all that are necessary to successfully machine with aluminum. Foremost among these considerations is a simple change in tool angle—a *new angle* in screw machine work that means bigger profits for you—through aluminum!

• **Cutting Tools.** Like any metal, aluminum machines best at certain tool angles. The same tool materials can be used, but some tools must be ground to new angles differing slightly from those used with brass or steel. Maximum efficiency is obtained when cutting tools are designed with proper rakes, clearances, and chip-breakers. Let your Kaiser Aluminum engineer or Kaiser Aluminum distributor recommend angles proved best by operators experienced in aluminum. Carbide-tipped tools should be employed on long runs, but are not necessary on runs less than 5,000 to 7,500 pieces.

• **Turning Speeds.** On any existing screw machine, you can work Kaiser Aluminum stock up to the maximum efficient speed of the machine. Speeds and feeds selected will vary with depth of cut, whether operation is roughing or finishing.

• **Chips.** Aluminum alloys commonly used in screw machine operations form chips that curl and break satisfactorily. Alloy 2011 (11S) breaks into small chips similar to brass. With other alloys, chip breaking grooves ground into the tool assist in producing chips that are easily handled.

• **Thermal expansion.** Aluminum has its own rate of thermal expansion as do all metals. Experience quickly indicates how to compensate for this expansion. Recommended coolants are employed to assist in controlling this factor.




**bars, billets and forgings in sizes, shapes and treatments for every need!**

Wheelock, Lovejoy & Company, Inc., can fill your alloy steel requirements promptly. This applies to both standard AISI and SAE steels and to our own HY-TEN steels—"the standard steels of tomorrow". Take advantage of our seven strategically located warehouses. All of them can supply these steels in the form and quantity you need. Every warehouse, too, is staffed with expert metallurgists who are ready to serve you.

Write today for your FREE copies of Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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**WHEELOCK, LOVEJOY & COMPANY, INC.**
**137 Sidney Street, Cambridge 39, Mass.**

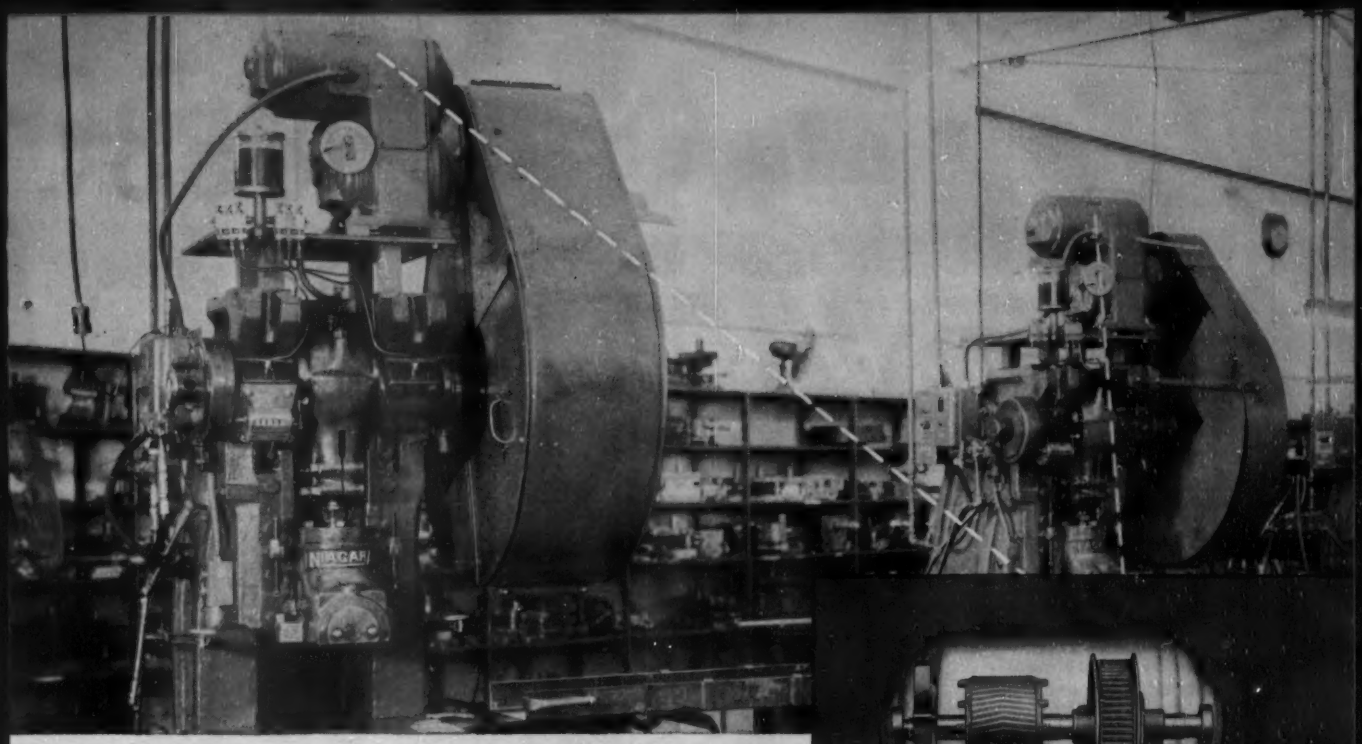

two weeks later he was parking it at the rear of a competing firm where he was now employed. The indifferent manager had lost his best toolmaker.

From a health standpoint it is doubtful if the permitting (on the company's property) of strenuous games during the noon hour is wise. The players either surreptitiously eat their lunch during working hours or wolf it down in a few minutes as soon as the siren sounds. Strenuous exercise immediately after a fast meal is apt to cause more damage than good to physical well-being.

Some companies, I know, make a special effort to provide light exercise for the office force during the noon hour, for it is the white-collar men who really need a relaxation period. In fact, one well-known firm gave the office workers an hour and a half during the hot weather for the lunch period so they could, if they chose, go to a nearby swimming pool and have a good swim *before* having their lunch and the result of this experiment was so good that the hour and a half lunch period was made permanent.

At another firm a large athletic field was fenced in and made available to the men, but in this case the foremen were instructed to observe and report the effect of strenuous play on the afternoon production and the report was so unsatisfactory that the field was closed until 12:20 pm so the wolfers gained nothing by downing their lunch in a few minutes. The eating of food in the shops was also prohibited because rats and cockroaches were rapidly increasing, and after this control was established there were no further objections. I really believe that afterwards the men had better health and

*"This camera is for time and motion—you'll have to get your screen test somewhere else."*



## PUNCH PRESS OUTPUT UP 30% WITH SPEED-TROLS AT SQUARE D CO.

Replacement of single speed motors with Speed-Trol variable speed drives on punch presses at the Los Angeles factory of Square D Company resulted in the following advantages, reports L. G. Maechtlen, Vice President: Production increased 30%...spoilage or rejects reduced 10%...presses adapted to 40% more jobs...100% synchronization of punch press speed and operator's ability...employee morale greatly improved.

# Speed-Trol...Variable Speed at its Best

### OUTSTANDING FEATURES:

**A Single, Compact Power Unit** containing motor, variable speed transmission, with or without integral speed reducer—**Effective Cooling Systems** with direct-through ventilation, dual or internal cooling—**Positive Pulley Adjustment** for infinite speed variation, accurate speed selection and regulation—**Fingertip Control of Speed** with standard or remote controls—**Specially Designed V-Belt** for heavy duty, long life—**Protected Designs,** drip-proof, splash-proof, totally enclosed—**Rugged Construction** for continuous duty, permanent bearing alignment—**Streamlined** for easy cleaning, better appearance—**Interchangeable Mounting Dimensions** between constant and variable speed drives—**Versatile Mounting** for any position—**Smooth, Quiet Operation** through dynamic balancing; Herringbone Rotor; pre-lubricated, double shielded ball bearings—**Low Installation Cost** due to compact design, versatile mounting, interchangeable mounting dimensions.

**20-PAGE ILLUSTRATED CATALOG** ...Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. L-410.

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Sterling Slo-Speed Electric Power Drives—for geared low speed at its best
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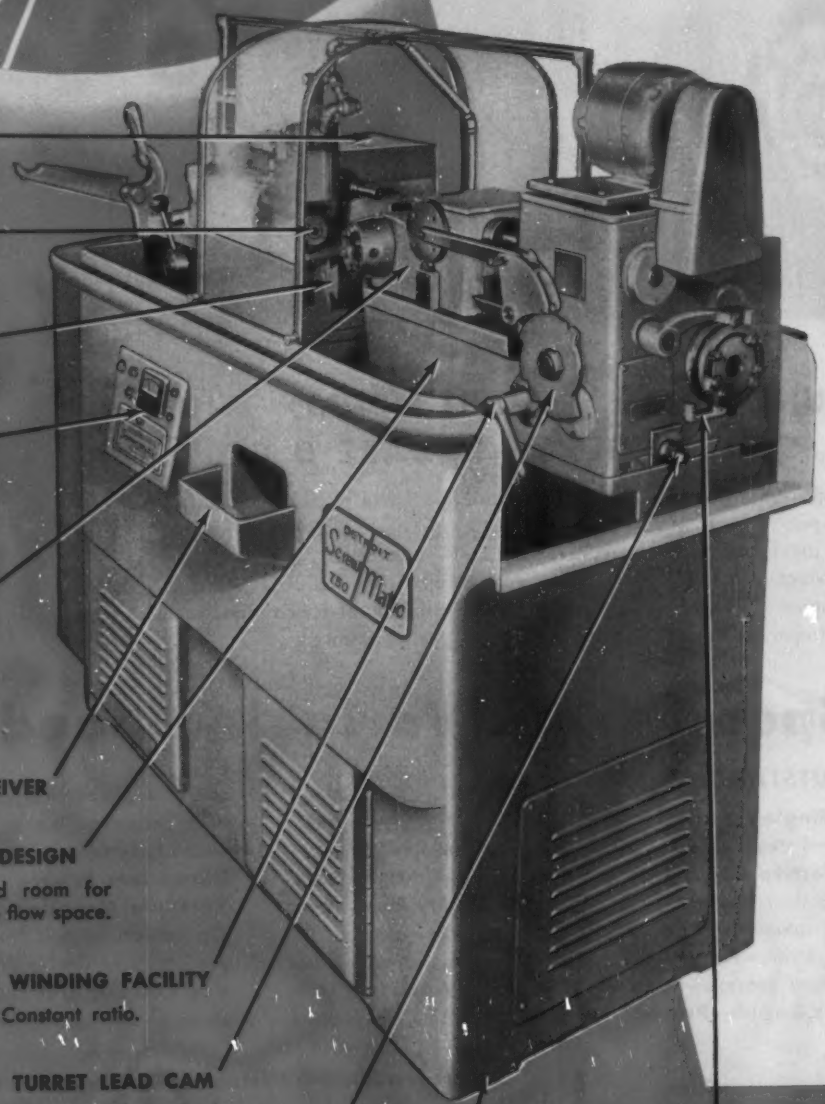
# DETROIT Screw Matic 750



**ATTACHMENT MOUNTING FACE**

**WORK SPINDLE**

Driven by independently supported V-belt and sheave.

**CROSS SLIDES**

Direct cam operated.

**SPINDLE SPEED**

Infinitely variable and reversible. Controlled by simple dial setting. Three preset, independent cutting speeds are conveniently adjustable during cutting.

**TURRET SLIDE**

Equipped with a three-position crank setting to adjust turret unit away from the spindle.

**PARTS RECEIVER**

**OPEN FRONT DESIGN**

Provides unrestricted room for turret tools and chip flow space.

**HAND WINDING FACILITY**

Constant ratio.

**TURRET LEAD CAM**

Readily mountable and always visible.

**TURRET AND CAMSHAFT UNIT**

Self-contained and slideable along machine bed.

**OVERLOAD SAFETY DEVICE**

Readily accessible position and easy to reset.

**MACHINE BASE**

Sturdy, one-piece, rigid cabinet. High walls give protection against oil spillage.

# WORDS about a *Completely New* Screw Machine

Now, for the first time in 20 years, a new development has been made in screw machine engineering. Three new design principles have been incorporated in the Gear Grinding Machine Company's SCREWMATIC 750 that, in terms of lowered costs and increased production, make it the greatest advancement in screw machine history:

1. Infinite variable spindle speeds instead of gearing.
2. Work spindle drive through V-belts instead of roller chains.
3. Low pressure air cylinders for stock feeding instead of a constant speed backshaft.

These design elements have made possible many outstanding performance features. The SCREWMATIC 750 is now ready to give you—

### Higher Work Output Because . . .

An infinitely variable spindle speed drive permits a choice of three different spindle speeds in any cycle of work. Various speeds are obtained by a simple dial setting and are adjustable during actual tool cutting. Reversibility of any of the forward speeds eliminates need of left-hand tools.

### Greater Precision . . .

Through arrangement whereby the precision spindle bearings carry cutting tool pressures only. No drive members or clutch bodies are carried by the spindle proper. The precision spindle bearings are anti-friction non-adjustable standard type.

Chatterproof, accurate forming is assured by heavy section cross slides, guided on vertically arranged dovetails. Slide unit is mounted upon deep wall supports. Slides are direct cam actuated. Micrometer adjustment and concealed dead stops are provided.

A six station turret is held in precision needle bearings and locked in hardened taper bushings. This assures accuracy through perfect tool alignment with work spindle. A subbase slide guide permits ready realignment after years of service.

### Tool and Cam Layout Simplified . . .

Infinitely variable spindle speeds, together with unrestricted tooling space, simplify tool and cam layout computations. Machine operators will appreciate the fully visible lead cam and setup facilities.

### Outstanding Work-length Capacity . . .

A turret slide unit, including the lead cam and drive, mounted longitudinally, slides along the machine base. The unit can be positioned away from the spindle so as to permit work pieces up to 6 inches in length to be machined with turret tools. Even at such lengths, no tool crowding exists—nor are cam "cut downs" required.

This arrangement does not impair economical production of long, short, or medium length parts, for the turret slide and index stroke and speed can readily be changed to suit such parts. All work is produced in the most expedient, economical manner.

### Tooling Accessibility . . . Free Chip Flow . . .

The open front design, with its high wall cabinet, permits maximum tool accessibility and tooling space. Chips flow into an ample size, deep chip well. Open ended provision permits chips to be removed from well during machining operations.

### Tooling and Attachments . . .

The SCREWMATIC 750 accommodates standard collets, feed fingers, cams and tool holders. In designing the SCREWMATIC 750, special emphasis was placed on incorporating in the machine facilities to adapt readily all commonly used attachments without obstructing the accessibility to tools or the free chip flow.

### Simplified Machine Versions to Suit Customer Requirements . . .

The unit design permits the SCREWMATIC 750 to be supplied in simplified forms for long run production of simple parts. The machine can be delivered without such features as variable spindle speeds and spindle reversal. The turret slide can be replaced by a plain tool slide. The spindle is then driven directly from an electric motor over V-belt sheaves.

### Capacity . . .

The SCREWMATIC 750 takes bar stock up to .750 inches diameter. For heavy duty machining, standard size collets and feeders are used. The maximum standard spindle speed is 5100 r.p.m.'s. Higher speeds are available on request.

The longest lengths that can be turned with a standard 7-inch diameter cam are 2¼ inches. Longer turning lengths are obtainable with a larger diameter cam.

Cam shaft cycle speeds range from 1.8 to 240 seconds. The SCREWMATIC 750 accommodates standard turret tools with shank diameters of .750 inches.

The SCREWMATIC 750 is manufactered by The Gear Grinding Machine Co.—a company known for its accomplishments in precision, speed, and automation in the field of gear grinding . . . the company that produces the intricate Rzeppa Constant Velocity Universal Joint.

Should you wish detailed information and photographs, use the coupon below.

DETROIT Screw Matic 750

**The Gear Grinding Machine Co.**

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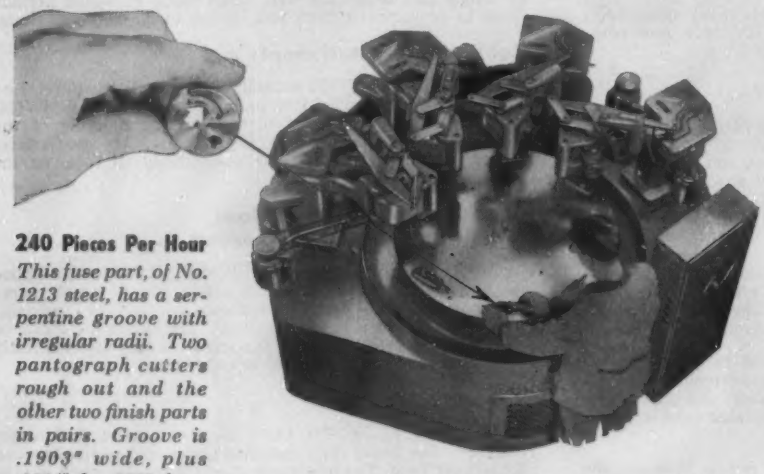
# *High Production*

## with GORTON MULTIPLE-SPINDLE INDEXING PANTOGRAPHS

Multiple operations with exceptional repetitive accuracy give you production-line performance on Gorton Multiple-Spindle Indexing Pantographs. From two to six different operations, performed at one setting, result in both precision and economy. Automatic cycling during engraving, milling, profiling, chamfering, counterboring, grooving or routing.

Infinitely variable feeds up to the capacity of any existing cutter. Reversing drive for conventional or climb milling.



**240 Pieces Per Hour**

*This fuse part, of No. 1213 steel, has a serpentine groove with irregular radii. Two pantograph cutters rough out and the other two finish parts in pairs. Groove is .1903" wide, plus .0014", by .109" deep, plus .003". Finish: 35 mcr.*

**194 Pieces Per Hour**

*These die-cast spectacle frames incorporate "V"-shaped grooves or bezels for left- and right-hand lenses. The bezels do not lie in a horizontal plane but require a "rise and fall" in cutter movement to accommodate convex lenses. This machine mills grooves in both lenses automatically during the cutting cycle.*

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**GEORGE GORTON MACHINE CO.,** 1511 Racine St., Racine, Wis., U.S.A.


were more serious about their jobs and good production records.

Intelligently-supervised noontime athletics probably pay off, but uncontrolled scrambles, as Al says, cause second-quality work and production losses and, therefore, should be avoided.

George P Pearce
*Albuquerque, NM*

WE HAVE HAD THE PROBLEM OF NOONTIME BASEBALL and it was necessary to take steps to remedy the situation. We are presenting our solution in the hope that it may be of value to some other shops.

We have a comparatively small shop, but it is in Brooklyn where the baseball fever comes early and hits hard. Before the echo of the lunch bell had died out, our gang would be out in the back lot with their bat, ball and lunch bags. In fact, a number of them would sneak off during the morning and eat their lunch ahead of time. They would not attempt to conduct an actual game,—that would be too slow. One group would get on the field with a batter and conduct infield practice, fielding grounders and throwing the ball around the bases. The second group would get out and chase fly balls. All in all, it was an hour of violent exercise in the heat of the noonday sun. The men would return to their work and find something to do which would permit them to sit down for a while, cool off, and rest. I am certain that this violent activity did not help them digest their lunch.

Of course, it was easy enough to see what was wrong, but what could we do about it? It was out of the question to forbid the men to play ball, or to even suggest that they take it easy during lunch hour. We have a good gang of workers with lots of ability and enthusiasm, but

*"Wow . . . Did you ever see such a beautiful pay day!"*

they are a gosh-awful independent lot. If we tried to kill some of their independence we would probably be unsuccessful and would lose some of the spirit and hustle which is so necessary to the successful operation of a job shop.

We decided that the best solution was one of substitution. It was very desirable to have the men engage in some sort of relaxing activity during lunch hour as long as it was not excessively tiring. We did not, above all, want them to sit at their bench and doze off. I know from my own personal experience that this is a very bad practice. It takes hours before one is fully awake after dozing off in this manner.

We finally hit upon a good answer. We let them finish out that summer and fall with their baseball and all its faults. Then as the weather turned cold, the company purchased a number of sets of bocce balls. We had a few employees of Italian parentage in the shop, and we got them to show the others how to play the game. It caught on like wild-fire and they played all winter, weather permitting. When the spring and summer came they kept playing bocce. They have been playing for two years now, and we hope they will never get to baseball. Bocce is much less violent than baseball and does not require any running, but there is plenty of opportunity for teamwork as well as individual skill.

In addition, we have provided a magazine rack in the shop and keep it well stocked with fresh issues of shop journals (including American Machinist). Another activity which is worthy of consideration, provided the floors are suitable, is shuffle board.

There are, no doubt, other methods of handling this problem, but our solution produced the desired result. Bocce requires very little in the way of space and equipment, and it was really a life-saver to us.

H G Koslow
*Bronx, NY*

I HAVE OFTEN ASKED MYSELF if sports promote health and good manners, as claimed by the leaders of all kinds of sporting activities. I'm afraid these activities all over the world are overdone. Isn't it so that young people simply have been influenced by the propaganda for sports activities carried on by the newspapers?

On the whole I think sports nowadays have been too much turned into competition and business. Sports of all kinds should be play, just hard enough to fill the lungs with fresh


# ACCO Registered* Slings

Photo courtesy Allis-Chalmers

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• Maybe you have dropped a load in your shop. The damages, and loss of production, came to a pretty penny. But you can guard against such accidents by calling your nearby ACCO *Registered* Sling distributor.

From him you can get a variety of sling chains to the length you need, with your choice of sling, grab, or foundry hooks and fittings that will fit the sling exactly to your work. For instance, you can get ACCOLOY sling chains in sizes from ¼" to 1¼" that have four-leg working load limits from 9,500 lbs. to 199,000 lbs. at a 60° angle. These limits are not theoretical. They are based on actual proof-testing of each completed ACCO *Registered* Sling Chain to insure safe operation.

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5. Metal identification ring on each sling
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This new deep-drawn aluminum machining stock developed by Harvey has acquired peak production characteristics for the metal machining industry by means of the unique method by which it is "worked". Deep-drawing under extremely high pressure creates a completely new metallurgical structure. The resulting macrostructure change of the metal, giving high, consistent uniformity from the outside to core, is to a large degree responsible for the fine machinability of the new material. It allows fast cutting with highly desirable small chips, yet extends tool life, and gives true threading.

## Harvey deep-drawn machining stock was developed to meet our own exacting needs

The completely integrated facilities of the Harvey plant at Torrance, California—foundry, extrusion mill, and large machining plant all under close engineering and metallurgical control—have provided ideal circumstances for the development of Harvey's special deep-drawn aluminum machining stock. More than 40 years of machining all types of material brought out the conditions necessary for top quality aluminum stock. Harvey metallurgists fulfilled those conditions and now it is available for your machining operations through any of the Harvey Aluminum Sales offices. Write for the bulletin on New Harvey Machining Stock.

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air and move the muscles gently, but no more. Some doctors claim that overdoing sports drains the brain of so much nourishment that one cannot think clearly. At any rate, a tremendous lot of energy is expended every day on games that never pay any dividends. Why not use that energy to improve knowledge, build a house, grow vegetables or develop paying hobbies? If a corresponding amount of energy were used to increase production, our standard of living would increase.

When sports of the kind we most commonly know started in ancient Greece several thousands years ago, the purpose was to give young members of the nobility something to do, so that their muscles would not wither, as they considered it beneath their dignity to do useful work. Their efforts were also a physical preparation for war. Now, is it necessary in our hustling times to practice energy-consuming exercises to prevent our muscles from withering? I don't think so, except perhaps for office workers who are sitting still all day long. And doctors tell us to take it easy if we want to live many years. Today, it seems to me, every man in any machine shop gets enough exercise without ball games.

However, I don't consider the problem of noon-hour games a very serious issue; too few men compared to the total number of employees take part in them. So if I were Al I wouldn't pay much attention to these games. The cut in the production cannot be so great when so few are participating. On the other hand, if it is true that production drops seriously after every ball game, Al should talk to those taking part and tell them that if they want to continue their games they must see to it that production is not impaired.

The efficiency in Ed's and Al's shop will probably not suffer appreciably from the effect of these games; the increase to about 10 o'clock and the peak reached at about 3 will in all probability be the same, game or no game. At least young men should have enough energy left after a short game to work as usual.

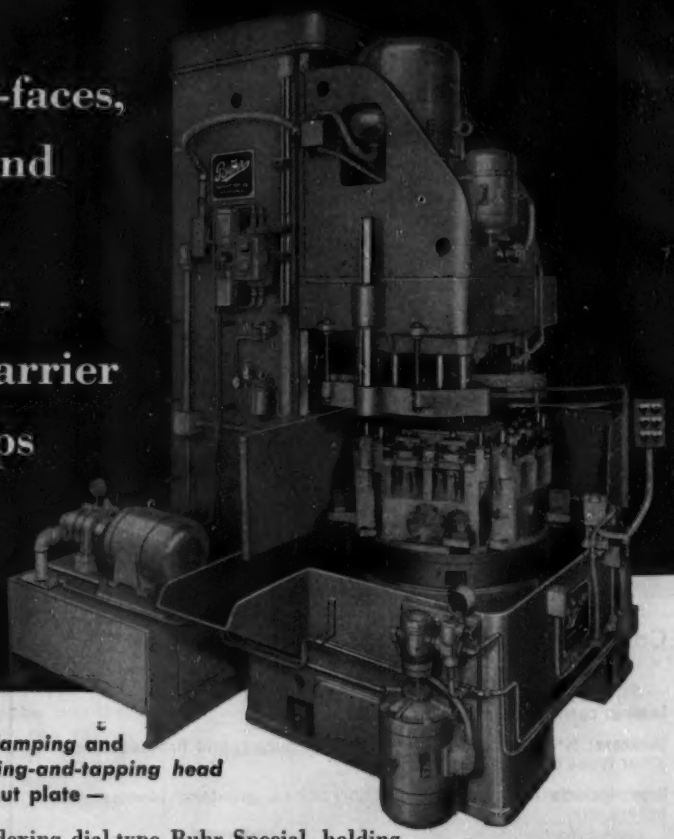
But there are other reasons for not being too enthusiastic about sports at noon or in the evening. One of them is that accidents often happen in connection with outdoor activities. Sprained ankles, lost teeth, broken arms or legs, damaged hearts, and back ailments are quite common.

Ed is probably right when he says that bad feeling would occur if the noontime games were forbidden, but

# Buhr

# SPECIAL...

## Drills, spot-faces, chamfers and taps 670 differential-carrier bearing caps an hour!



**Featuring *fully automatic clamping* and *a special combination drilling-and-tapping head* with an independent lead-nut plate —**

This 5-station automatic-indexing dial-type Buhr Special, holding four parts per station, machines 670 pieces per hour at 100% efficiency.

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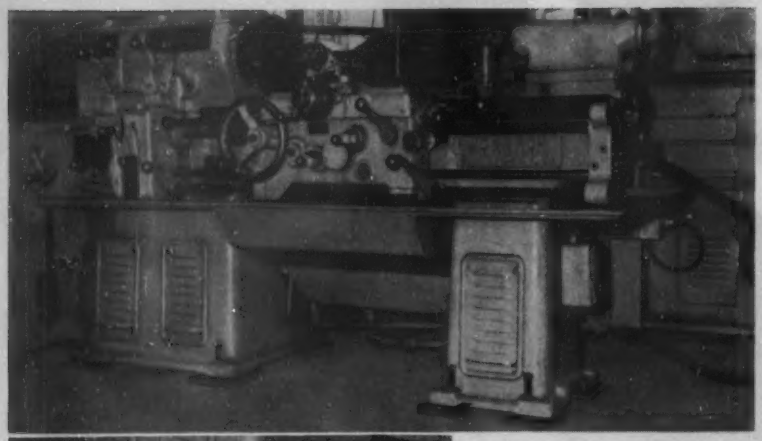

Precision lathe mounted on new Type "T" UNISORB. Bottom photo shows close-up of machine base and use of UNISORB with leveling screws and steel plates.

# New Type "T" UNISORB® Mounting Pads Used for Precision Machines...

For precision machines which must remain extremely level during operation, Type "T" UNISORB is now available. Like other types of UNISORB, this type reduces transmitted vibration and is used without bolting machines to the floor.

## Condensed information about new Type "T" UNISORB Mounting Pads

**Loading:** carries loads of 75 to 125 lbs. per sq. in.

**Thickness:** ½" thick material with a greater density and firmness than other types of UNISORB.

**Uses:** include mounting of precision lathes, grinders, planers, jig borers, etc.

**Resistant** to petroleum products, mild acids and plant water conditions, Type "T" UNISORB provides a firm and durable mounting.

For the complete story about this new product and other types of UNISORB Mounting Pads, return the coupon today.

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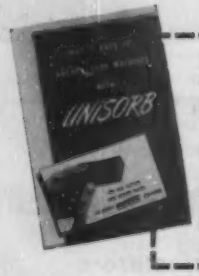


***RETURN COUPON NOW!*** Please send information about Type "T" UNISORB and the booklet "Facts About Anchoring Your Machines with UNISORB".

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why not give the young fellows a lecture and point out that sports should never be overdone so that production drops. To forbid the games would perhaps damage morale; to some extent it would taste of dictatorship.

But why doesn't Al call Harrison's attention to this problem before the production drops? He might have a solution that would lift the worries from Al's shoulders. And this is certainly a question that should be of interest to management. I don't quite understand why Al is taking this issue so seriously onto himself. Unless he has orders from Harrison to investigate this problem he might as well drop it altogether.

A E Fristedt
*Stockholm-Bromma, Sweden*

THERE IS NO PLEASURE without a tincture of bitterness. Nor can the fun of noontime athletics fail to carry with it its toll of slow-down in afternoon production. However, in my opinion, it is a matter for the foreman to take up with his men, in cautioning them to take it easy on their lunch hour as far as strenuous noontime baseball is concerned. It's a matter of prudence and being temperate in actions that might affect efficiency.

To paraphrase Franklin's admonition: "Reckless youth makes rueful age," the noontime commandos should realize that reckless noonhour athletes make poor afternoon producers.

A worker's lunch time may be his own to do with as he chooses, but his employer has a right to inquire or interfere when the activities engaged in affect the efficiency of the worker and the interests of the employer. Where evidence exists that output drops after lunch time and strenuous baseball activity was indulged in during that time, there is only one solution; the foreman should put it

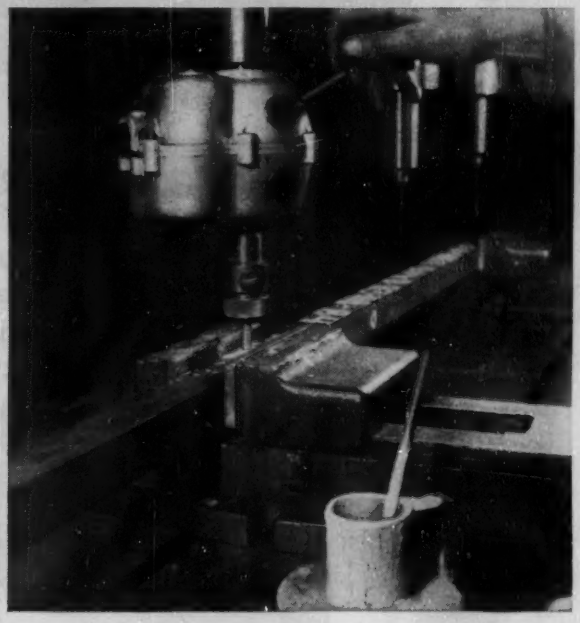
*"Had a swell day—I was never nastier!"*

# The Engineer's Report

CASE HISTORY
Calol TR Compound
LUBRICANT

Westinghouse Electric Corp.,
FIRM Sunnyvale, Calif.

# Westinghouse doubles tapping machines' output!



SINCE USING CALOL TR COMPOUND in place of the usual tap lubricants at the Westinghouse plant in Sunnyvale, California, operators have been able to run tapping machines, like those above, at twice the previous speed without rejects. In spite of the increased speeds, taps now last two to three times longer in work with all types of steel, including stainless. Sam Margolis, Group Leader, says that Calol TR (Tapping-Reaming) Compound not only lengthened tap life but doubled machine output.

REMARKS: This plant manufactures switch gears, transformers, and other electric and electronic equipment. In addition to iron and steel parts, special alloys such as silicon bronze are machined.

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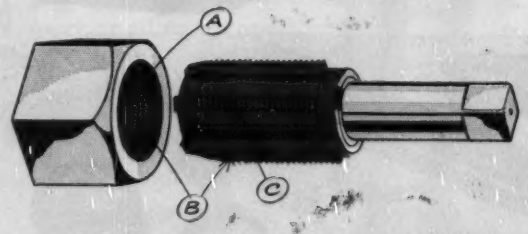
## How CALOL TR Compound ups efficiency in severe metal-working conditions




A. Contains two unusually active extreme-pressure additives—prevents tearing, scuffing, galling of work, promotes good finish.

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up to the men on an informal basis and let them know it is a problem that can best be solved by the men themselves, rather than have the company set up a rule forbidding games at lunch hour.

There is no valid reason why the noon hour should not be a period of relaxation with a modicum of athletic indulgence. Moderation should be stressed. I see no reason for entirely prohibiting playing baseball; throwing a ball around in an easy and informal manner does not entail the stress and physical exertion of regular baseball games that some workers engage in during the summer months.

Experience has demonstrated that athletics after working hours are beneficial to the workers. Where properly conducted company athletics are available, there will be little reason for noontime games. Company sports are an excellent source of improved morale and group spirit. However, such sports should not be abused to the extent where they are carried over into the lunch period. Where noontime athletics affect production adversely, they should be toned down, or if that is not carried out by the men on their own volition, a company rule should be promulgated forbidding such games. The risk involved is unfortunately more detrimental to production than the possible relaxation the workers may gain during the lunch hour through indulgence in these activities.

Forbidding the games at lunch hour would probably cause bad feeling, which would, in turn, cut production in the same manner as if the men were permitted to play ball during lunch. However, there may be a compromise which will let the men enjoy their sports in a modified manner and still not interfere with production. When the men realize that the company has their interests at heart and is not arbitrarily banning lunch time sports, the problem will have a solution acceptable both to management and workers.

On the whole, it is difficult to know how far a company can go in interfering in a man's personal actions during his own time. However, if a particular worker's production is definitely slipping as a result of overindulgence in sports during the lunch hour, the company is justified in warning the man that such activity is out of order. The foreman in this instance can mention to the man that his work has fallen off, and, since the trouble emanates from noontime activity, a lessened indulgence in that line should help solve the problem.

# "KNOW HOW"

The ability of a bird dog to flush a pheasant, to retrieve and to follow the basic rules of the "point" . . . is the result of natural aptitude, training and experience — qualities that combine to form the priceless ingredient called "know how".

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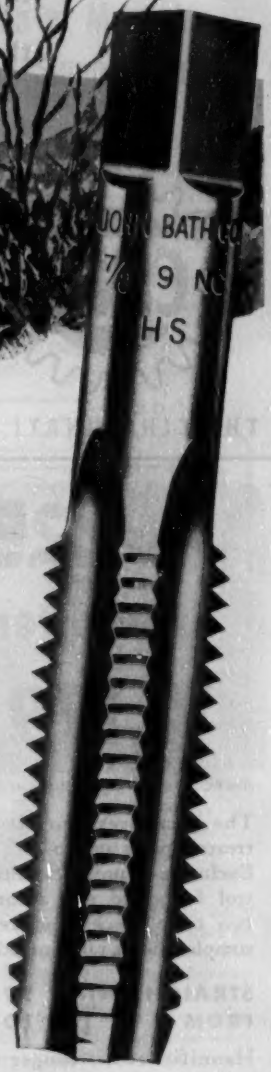


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The ideal press for straightening heat-treated parts up to 60" between centers. Exclusive Hannifin Sensitive Pressure Control for speed and accuracy. Ram block, two table blocks and center-type fixture complete with rails included.

**STRAIGHTENING PRESSES FROM 5 TO 150 TONS**

Hannifin offers longer tables and rails, roller-type fixtures, larger or smaller capacities (5 to 150 tons)—all at prices that are easily justified by savings on the job. Bring us your straightening problems.

**HANNIFIN**

HANNIFIN CORPORATION, 517 S. WOLF ROAD, DES PLAINES, ILLINOIS


The key to the whole matter of noonday sports is that the company does not have the right to enter into a man's private affairs during his own time any further than they affect his on-the-job time; but, because the man is being paid for a day's work, it is only fair that he be in condition to do that work. To that extent, the company can ask that a man keep his noontime athletics in restraint.

Spare time during the lunch hour should be used for relaxation, not energy-consuming sport. In this connection, a well conducted, pleasant cafeteria offers relaxation after the meal is eaten, an opportunity to engage in conversation with fellow workers, and lessens the necessity to bolt the lunch and rush out to play some strenuous baseball.

When a skilled worker hires out that skill, he is morally obligated to exercise it to the best of his ability for the benefit of his employer. It is legitimate for the employer to expect him to do so. The employer is paying for the use of the man's skill, therefore anything tending to lower the efficiency of the man's skill becomes a matter of concern to the employer.

So far as health factors are concerned, most industrial workers usually get enough physical exertion at work to satisfy normal needs.

The noon hour offers a palliative against fatigue and helps to keep up the curve of production without diminution. As a fatigue-deterrent it should be appreciated by the workers and observed as a period of physical and mental relaxation. When worker and foreman understand this there will be no problem about noontime commandos. Reasonable men always agree if they understand what they are talking about.

Harry Kaufman
*Philadelphia, Pa*

•

## GOSSIPING WIVES

*How much importance should a foreman attach to a supposed or legitimate gripe existing in the shop which he hears about indirectly? Should he attempt to clear it up?*

IT LOOKS AS THOUGH AL is running out of ideas when he has to involve the women in the affairs of the shop. I can readily understand what he is driving at because I am a housewife, and I have had my hands soiled with shop work in the last war. So you can see, Mr Editor, you are going to get a very practical reac-

*at Cogsdill Twist Drill Company*

# 73% LONGER GRINDING WHEEL LIFE with HOUDAILLE "J" Type Coolant Clarifier

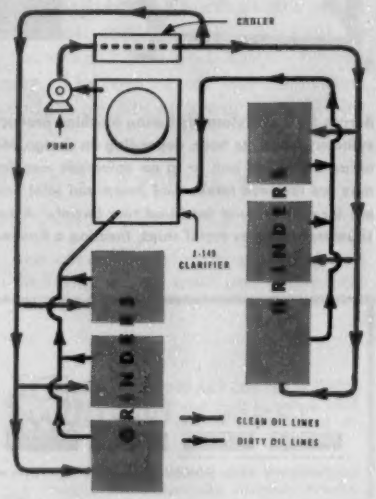
Houdaille J-149 Clarifier shown in operation at Cogsdill Twist Drill Co. 149 filter tubes suspended vertically within clarifier remove all abrasive contaminants from coolant without precoating, filter aids or expendable filter material of any kind.

## Drill Manufacturer Also Reports Fewer Rejects, Elimination of Manual Pump and Sump Cleaning

*Detroit* (*Spl.*)—73% longer wheel life, better product finishes, and indefinite safe-use life of coolant—these are the benefits reported by Cogsdill Twist Drill Company since installation of a Houdaille J-149 Coolant Clarifier.

At Cogsdill—a leading Detroit manufacturer of drills and reamers—the "J" Type Clarifier provides centralized, multi-tube filtration of grinding coolant for six flute grinders.

Here's how the Cogsdill central coolant system operates:



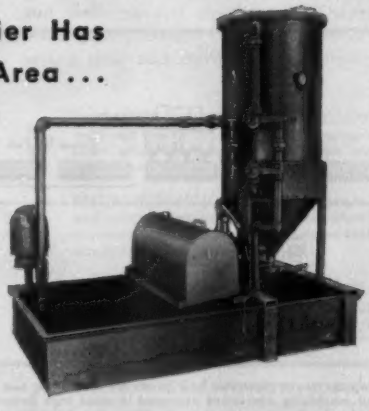

Cogsdill states that grinding wheels, formerly dressed after a run of 75 pieces, now have an average life of 120 pieces. Clean coolant also prevents overheating and subsequent burning of drills.

Elimination of individual grinder pumps and sumps, which had to be serviced every two weeks, has greatly reduced labor and maintenance expense.

Thanks to the Houdaille "J" Type Clarifier, Cogsdill now gets more production from its grinders at less cost and at higher operating efficiency.

## NEW MULTI-TUBE DESIGN MEANS MORE FILTERING CAPACITY AT LOWER COST

### Houdaille "J" Type Clarifier Has 16,000 Sq. Inch Filtering Area... Self-Cleaning Filter Tubes



The "J" Type is ideal for all water based or mineral oil coolants used in individual machine tools or small central systems. Its 16,000 square inches of filtering area assure complete removal of chips, abrasives, dirt and other solid contaminants . . . keep coolant safe for re-use indefinitely.

Self-cleaning filter tubes, washed free of contaminants during brief backwash interval, require no manual cleaning or maintenance.

Simplicity of "J" Type's design assures dependable, low cost operation—no need for precoating, filter aids or expendable filter media.

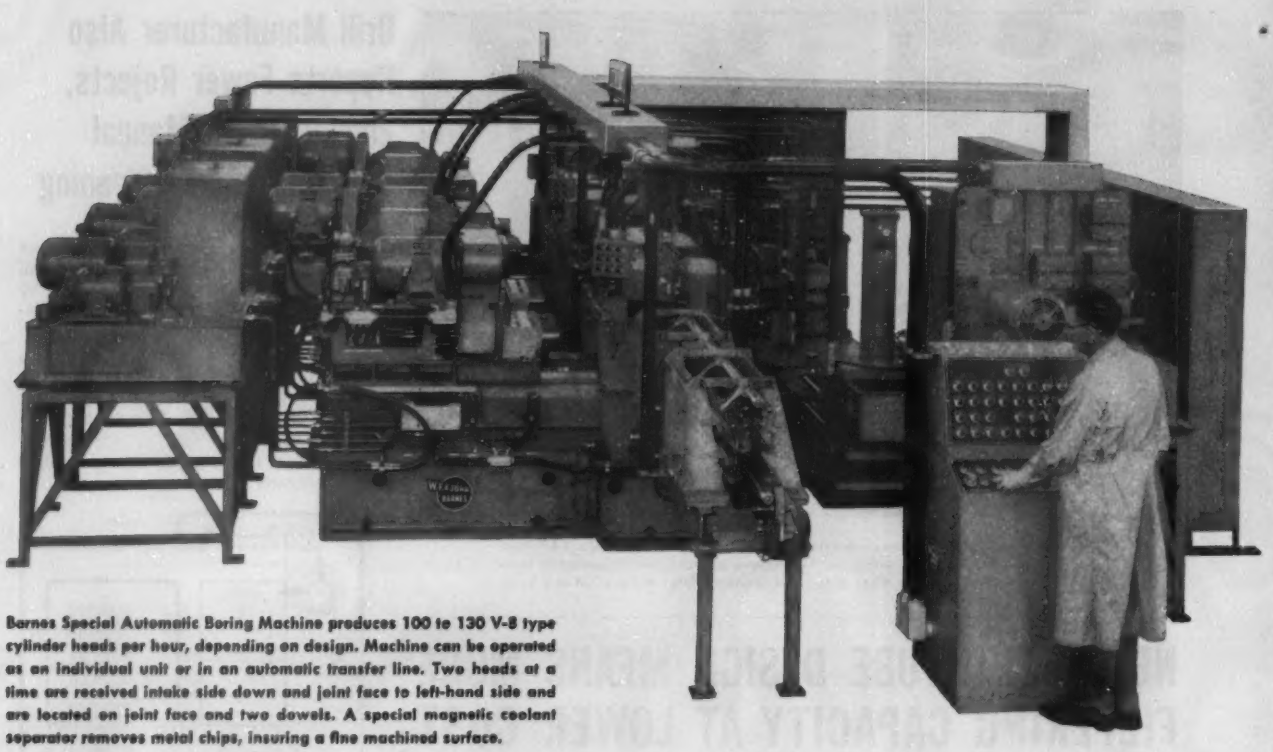
Unit can be operated continuously or intermittently as desired. Several models available depending on capacities to be handled.

Write for equipment bulletin and case history . . . find out how the Houdaille "J" Type Clarifier can extend tool and wheel life and boost overall production in your machine tool operations.

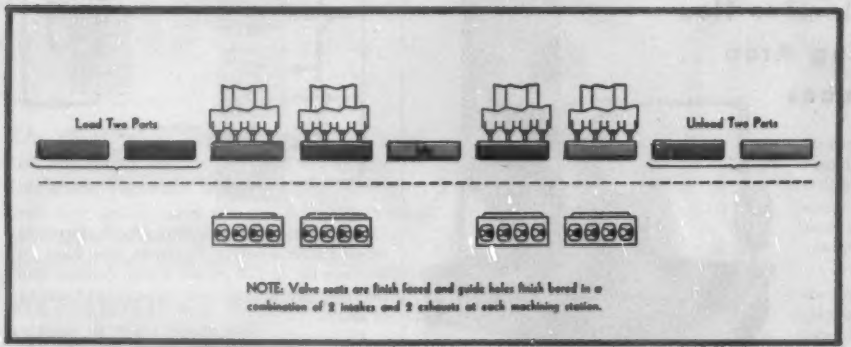
**HONAN-CRANE**
*Oil Purification Equipment*

Honan-Crane Corporation 205 Wabash Ave., Lebanon, Ind.
subsidiary of Houdaille-Hershey Corporation

# *Announcing* NEW MACHINING AUTOMOTIVE

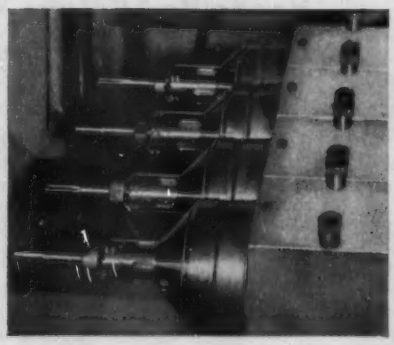


**Barnes Special Automatic Boring Machine produces 100 to 130 V-8 type cylinder heads per hour, depending on design. Machine can be operated as an individual unit or in an automatic transfer line. Two heads at a time are received intake side down and joint face to left-hand side and are located on joint face and two dowels. A special magnetic coolant separator removes metal chips, insuring a fine machined surface.**




NOTE: Valve seats are finish faced and guide holes finish bored in a combination of 2 intakes and 2 exhausts at each machining station.

**Diagram above illustrates how heads are transferred two at a time and machining operations arranged to meet high output requirements. For lower production, machines are designed with fewer machining stations and one-station transfer unit.**



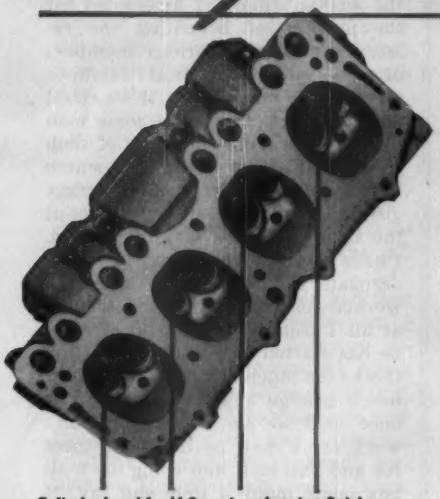
**Closeup of 4-spindle head with special tools for machining four valve seats and stem holes in one pass. Second 4-spindle head completes remaining operations.**

W. F. & JOHN BARNES

***Builders of Better Machines Since 1872***

**MULTIPLE SPINDLE DRILLING • BORING • TAPPING**

# PRECISION METHOD OF FINISH VALVE SEATS AND STEM HOLES *Automatically*



Cylinder head for V-8 engine showing finish machined valve seats and guide holes. Red arrows indicate operations performed at first machining station.

Concentricity of valve seat and stem hole held to .0005" total indicator reading.

## EXCLUSIVE W. F. & JOHN BARNES MACHINING DEVELOPMENT HOLDS TOTAL CONCENTRICITY WITHIN .0005"

Now, a new precision machining method developed exclusively by W. F. & John Barnes makes it possible for you to finish machine automotive valve seats and stem holes on a continuous automatic basis. You can now eliminate corrective operations after normal boring, reaming, and seating operations, because this new development holds total concentricity within .0005" (total indicator reading). This new machining process, as incorporated into Barnes Automatic Progress-Thru Type Machines, consists of multi-blade tooling for the valve seating operations, combined with modified gun drilling tools for precision boring valve guide holes. Production tests show the valve seat tools produce 10,000 to 15,000 parts, and the boring tools, between 2,500 and 4,000, before regrinding or replacement is necessary. The net result has increased production efficiency and improved product quality at lower cost. Write for more facts today.

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6. **COORDINATED DESIGN AND ENGINEERING**—Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

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Ask for free booklet "Coordinated Machine Engineering" describing the scope of Barnes machine tool building service.

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*Smooth* operation:

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Undercutting and reducing heavy welds is a smoother, faster, safer operation when you use Nu-Tex Depressed Center Disk Wheels. *Smoother* because Nu-Tex Wheels are designed with a built-in resiliency to reduce bouncing to a minimum, assure a steady, cushion-like grinding action. *Faster* because their cushioned cutting action distributes pressure evenly over grinding areas . . . makes every inch of surface travel an inch of productive cutting, whether you use portable or bench-type grinders. *Safer* because they're bonded together with an extremely tough resin for maximum durability . . . textile-reinforced to assure greater protection against breakage, longer life under continuous operation.

Why don't you investigate the time and money-saving advantages of Nu-Tex Disk Wheels? Straight and depressed center Nu-Tex Wheels are available in all popular diameters and thicknesses for cutting, slotting, roughing, smoothing, grinding or polishing. Grades range from 0 (hard) to 6 (soft). Write now for complete details. Atlantic Abrasive Corp., 516 Pearl St., South Braintree 85, Massachusetts.

*Specify* **NU-TEX** *for 360° of wheel efficiency!*

**ATLANTIC ABRASIVE CORP.**

**South Braintree 85, Massachusetts**

tion from a woman who is in the know.

From what I gather, our conscientious friend, Al, has evidently trod on somebody's toes either with evil intent or inadvertently. No matter how the job was perpetrated, somebody has a sore toe, so to speak. As a consequence Al gets shoved in the doghouse by his wife and has to weather the consequences of the tongue-lashing of another member of the fair sex.

It all came about by the weakness of one individual—the husband of the woman who pried the lid off at the woman's meeting assembled for the purpose of benefiting the relationship of the various members of the shop. Industrial relations would be so much better if we could only eliminate this habit some men have of bringing home tales of shop troubles. Believe me, that's where Bob stands out from the average guy; he never lets out a peep about the shop unless it's something good. I have yet to hear him say anything derogatory about any man he worked for. If there is any trouble at all I usually hear about it after he has started on the new job. Bob thinks too much of his health to harbor a grudge against any man; he once said to me that he couldn't work for a man he had no respect for and I've seen him bring his toolbox home many a time and say, "I just can't work with that man."

So far I haven't seen or heard of any discord in any of our women's meetings nor heard any remarks indicative of discord. It's heaven on earth to have things that way. It's just too bad that some men are so weak as to cart troubles home to their families. What good does it do? It only makes matters worse.

If I were Al I'd wait for a while to see if the man with the gripe approached me, and if he didn't, and

*"Of course, we must draw some sort of line between wishing to throw out the management, and not liking the way things are run at present."*

there was evidence that he carried a chip on his shoulder, then I would summon him into my office and lay my cards on the table. I'd have a showdown that would end forever any reference to the incident that was the cause of the workman's gripe in the first place.

There are so many instances where individuals were at loggerheads, and after they had a conference, one or the other would admit his error and the matter would be dropped right there.

There is only one way Al can help his wife and that is to take her over to the wife of the gripey worker and let her sit in on a conference between the four involved. It'll iron itself out if they are all honest with each other.

Evelyn Roundbottom
*Laguna Beach, Calif*

AL'S ONLY CUE IS to divorce his wife from that particular club and all shop affairs immediately.

Thirty-five years ago we had that same condition, in reverse, in a Nevada mining camp. I say in reverse, because in our case we had a first-class foreman with a nagging, vindictive wife. This spouse was continually quarreling and bickering with the wives of her husband's employees. To anyone who would listen, she would broadcast threats of vengeance and just what she was going to have her husband do to the husbands of the offending wives. She managed to keep the whole townsite in an uproar for ten months, and then one day she disappeared. Two months later we learned that some other wife over in Utah had caught her at a dance with this woman's husband and shot her, from the rear, in both hips. As I recall, nobody shed any tears.

Years later I learned another angle of this wife-problem at first hand. My wife, too, belonged to a bridge club. I had just taken over the management of a large and very fine machine shop. As a starter, I faced a rather difficult problem.

I had inherited a general foreman who had been with the company 20 years. This foreman was personally a very fine chap—the sort of man you would like to have as a neighbor. As a general foreman, neither I nor the owners could see him. He knew the work thoroughly and had tremendous experience in all phases of machine work. On the other hand, he was garrulous and opposed to change. The shop had grown from fifty men to over a thousand, yet one man

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Nothing cuts quite like Capewell's TECHNITE High Speed Power Hack Saw Blades. They will cut all materials, but the real proof comes when you've got a heavy feed through tough, hard-to-cut metals. The special alloy high speed steel from which this rugged blade is made is hardened and tempered under the most rigidly controlled conditions to give you maximum cutting efficiency and to make your blades last. Other brands manufactured include Capewell's well-known HIGH SPEED and SAFETECH Power Hack Saw Blades. Write for Catalog Specification Sheets 1121A and 11211, and for Capewell's "How to Use" book.

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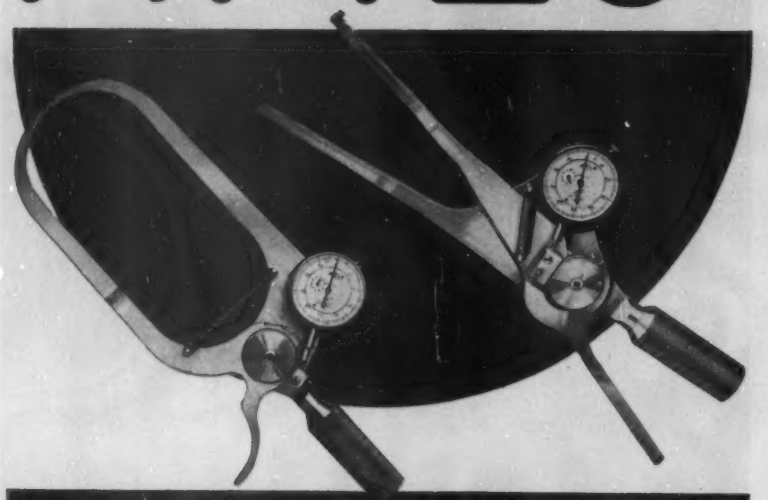

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Whatever your measuring problem — whether it's the inside dimensions of a pipe, the wall thickness of a casting, the outside dimensions of a rocket — Ames can build the caliper gauge that fills your requirements.

Ames caliper gauges are made of carefully-finished heavy gauge steel and are equipped with an Ames exclusive: a chordal error correcting cam that assures accurate readings. Ames calipers are available with contacts of various shapes — ball, flat or pointed — made of carbide, hardened steel, or sapphire.

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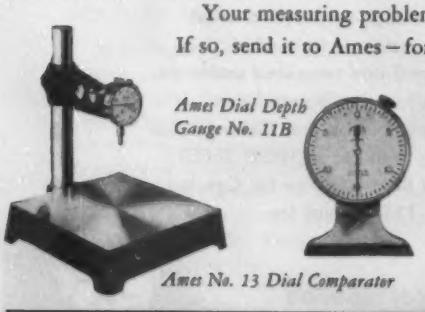

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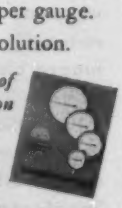

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really planned the whole thing. Men lolled around for half a day before they could get to him and secure a new job. As a starter, I had planned to functionalize the work, put in a much-needed planning system, and separate the inspection operations from the production crew. My general foreman was tolerant and easy-going, but totally unsympathetic to my plans.

"Aw shucks, Jim," he'd say, "why all this fuss and change? The boys do all right now. Let's let 'em alone."

I had been given carte blanche over the shop, and I knew that eventually I would have to remove the old chap. It's a grave responsibility to uproot a man of his dignity and past service, and I hated the job. Many times I had discussed the problem with my wife and told her what I proposed to do. I either had to get rid of the fellow or fall down on the whole scheme. Before I had an opportunity to handle the matter, the whole thing exploded in my face.

My wife attended the weekly meeting of her bridge club, which was made up of the wives of my fellow workers. Everyone knew I was in charge of the plant and was contemplating changes. Nobody cared about my proposed planning system, but everyone was keenly interested in what major personnel changes I proposed to make. Several of the older women at my wife's bridge table framed her.

"I wonder what changes Jim Matter is going to make in his new plant?" one of the women tossed out.

"Oh, he's not big enough to have any say in things like that!" sneered another dame.

And my wife fell—hook, line and sinker. "Oh, is that so," she retorted. "He's the one that's going to make the changes, and I'll tell you exactly what he's going to do." And she did.

I was in disgrace with the management for a year. My wife and I hardly spoke for two weeks. Her argument was that she was protecting me. Al's wife feels the same way. Al had better do what I did. I insisted that my wife drop out of that bridge club, and that was the last piece of important plant news that I brought home.

One last case. Sixteen years later I took charge of another set of plants. After the owner and I had completed all essential preliminaries, and fixed remuneration, I asked him:

"Those terms suit me. Now is there anything in the line of policy you want of me?"

"Yes," he said. "You are going to meet my wife and I am going to meet yours. But—I don't want your wife

# A SURVEY of importance to industrial managements

## Leadership

in any sphere of industry is usually well defined — by product, service, reputation. For a recent widespread survey, an outside unbiased research organization selected *files* . . . contacted the purchasing heads of 37 types of potential file-using industries . . . and came up with these interesting facts.

***"What make or brand of files do you prefer?"***

*"NICHOLSON" was voted first choice in 79% of the replies.* Nearest to this were competitive brands "A," "B," "C" and "D" with 26%, 15%, 7% and 5% respectively. Eleven remaining brands received scattered preferences totaling 10%. (Some 200 replies contained two or more "first" choices.)

***"What is of first importance in your file-brand preference?"***

"Product reputation," said 295 respondents. "Service," said 282. Only 28 said "Price."

***"From what sources do you buy your files?"***

"From Industrial Distributors," said 619 out of 695 — about 89%. And where Nicholson or Black Diamond brand is concerned the rate would be 100% — for that is the only channel through which Nicholson sells to the widespread industrial market.

• • •

The fact that these findings bear close similarities to other independent surveys made in the past leaves no doubt where Nicholson brands stand.

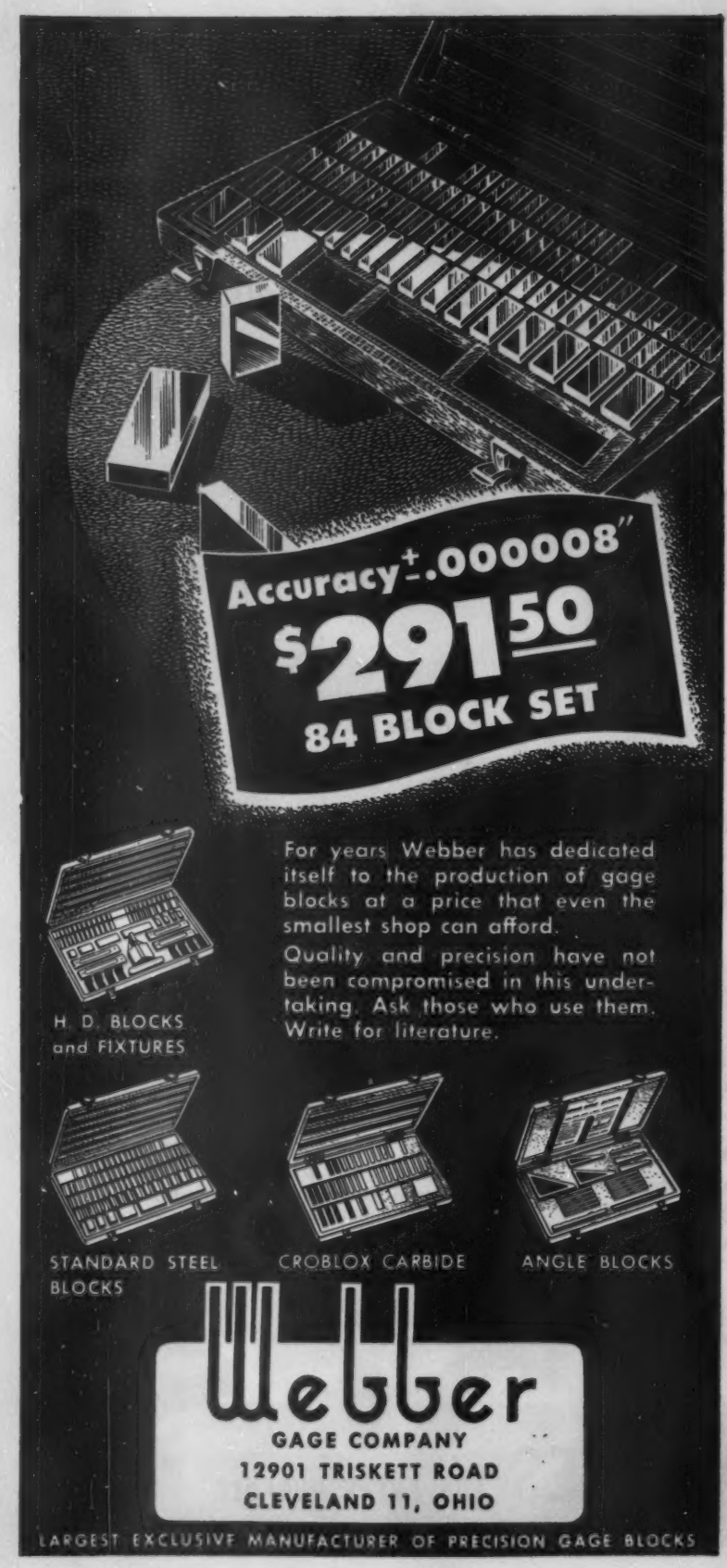
And what are the fundamentals to this emphatic Nicholson leadership? Product QUALITY, PERFORMANCE, UNIFORMITY and VALUE of the highest order. Product VARIETY that truly covers *A file for every purpose.* And, through your Industrial Distributor, the most helpful technical and supply SERVICE ever organized by any file manufacturer *anywhere.*

NICHOLSON U. S. A.

**NICHOLSON FILE COMPANY, PROVIDENCE 1, R. I.**

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

**NICHOLSON FILES** *FOR EVERY PURPOSE*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ever to meet mine. The day those two women get together, that's the day you and I part company. Understand?"

"Thoroughly!" I agreed, and saw nothing strange in his request.

A year later he told me his reasons. Twenty-five years before, when he started the business, there were three partners. My boss, Fred, was the leading spirit and the salesman. One of the partners was the manufacturer, or plant man, and the third was the financial backer, but a silent, non-working partner. Each partner held a third of the stock. The business prospered.

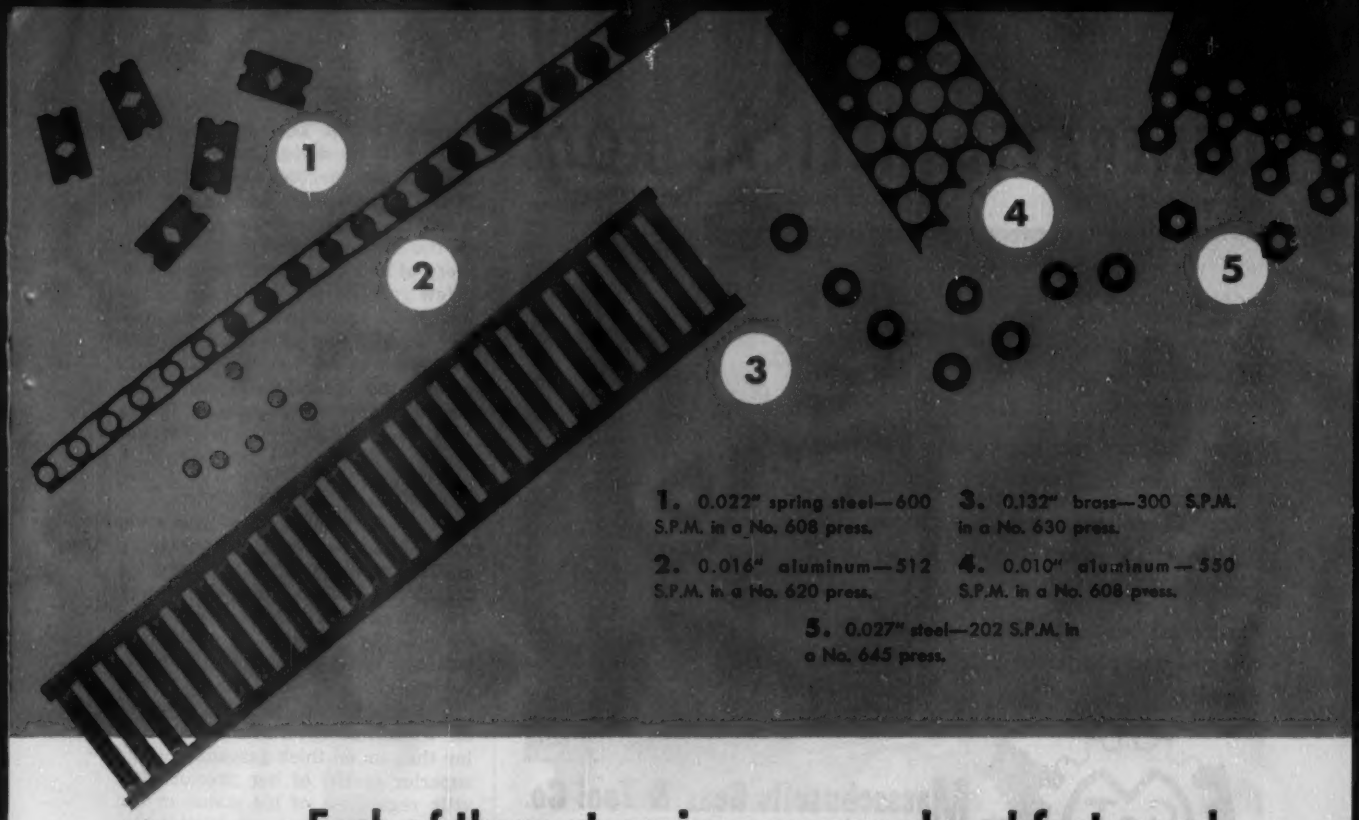
Twenty years after its inception, the financial backer died, and his widow inherited his share of the business. My boss's wife was a motherly type and took no interest in the business. The manufacturer's wife, however, wore the pants in her family and dominated it. In fact, she dominated the community.

At a meeting one day of the usual feminine bridge club, one of the members idly asked her, "I wonder what Fred—(my boss)—is going to do with your husband now that there are only two of them left?"

"He's not going to do a damned thing," answered this dominant female belligerently. "As a matter of fact, Charlie—(her husband)—is going to buy out the widow's stock and then get rid of Fred. Fred is too bossy anyway."

These words were carried back to my boss and worried him. A tug of war started. Both Fred and Charlie tried to buy the widow's stock. No dice. The widow knew her husband had drawn $18,000 in yearly dividends for twenty years, and that looked good to her. She wouldn't sell.

Fred, as sales manager and president, held the best hand. He proceeded to deliberately wreck the business. He refused to accept orders unless in carload lots. He threw small orders in the wastebasket and didn't acknowledge them. He tore up checks for small orders. He stopped advertising and reduced his sales force. As the business fell off, he laid off many employees; then in his capacity as president, he next laid off his partner. After paying his expenses there were no profits left and there were no dividends. His partner had no job and was receiving no income from his stock. The widow's stock in a profitless company had a value of zero. After five years of starving, the widow sold her stock to my boss for a nominal figure. My boss now owned the controlling stock, but he still wasn't satisfied. He started to rebuild the business, but any profits were re-




**1.** 0.022" spring steel—600 S.P.M. in a No. 608 press.

**2.** 0.016" aluminum—512 S.P.M. in a No. 620 press.

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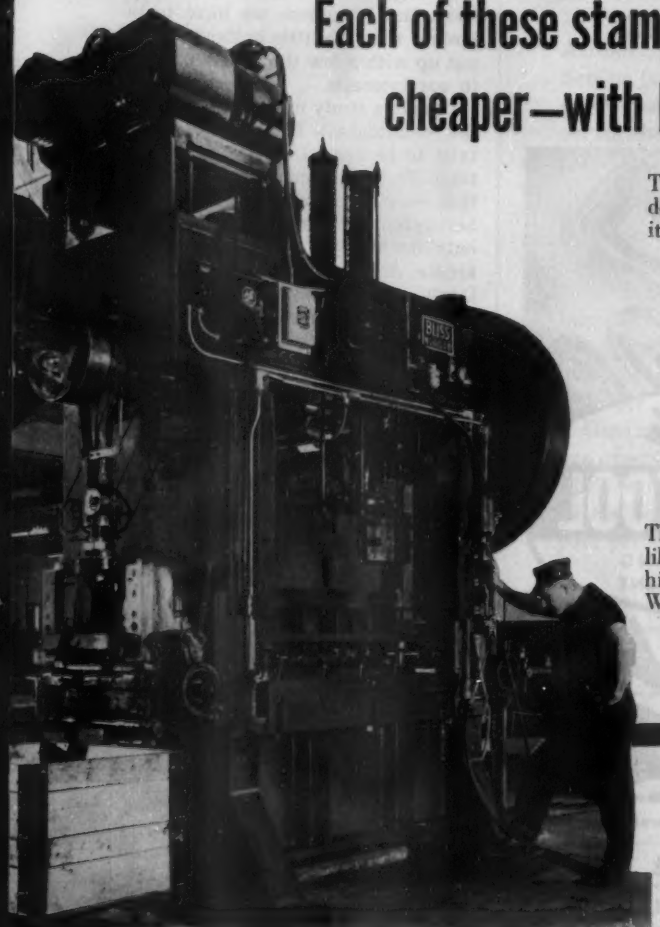
# Each of these stampings was produced faster and cheaper—with BLISS High Production Presses



The Bliss 600 series of High Production Presses, especially designed and developed for high-speed stamping, has proved itself on America's faster production lines:

- At Lima Register—5 Bliss Automatic Presses replaced 65 hand-fed presses. Example of the unusual savings: floor register valve costs only 1/25th of a hand-fed stamping.
- At IBM—5 Bliss Automatic Presses are used for short run typewriter parts production—die changeover is so easy that production has been boosted "an estimated 25%".
- At Briggs & Stratton—350 magneto armature parts are turned out each minute—on one 620 Bliss High Production Press!

There's a Bliss bulletin which describes in detail examples like these—examples which may show how you can solve a high production problem of your own—with a Bliss press. Write for catalog 27-A today.

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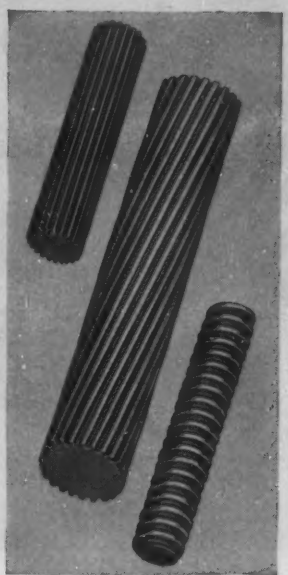
These rods are available up to 6 feet in length, from 5/32" to 1 ¼" in diameter.

Mass Gear products are made to A.G.M.A. standards, thus insuring uniform quality.

Illustrated brochure showing interesting designs and suggestions available upon request.



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WOBURN, MASS.

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Model M-1500

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West Coast Dist.: CAMPBELL CONTOUR ATTACHMENT CO., 1320 W. Esther St., Long Beach, Cal.


invested in the business, and there were still no dividends. Eventually his former partner and life-long friend was forced to sell his stock for a few cents on the dollar and get out of the business. And that is a true story of how a dominant female with a few careless remarks wrecked her husband's career and her own position in life. The idea that any wife in the world can help her husband's career by associating with his friends' wives is for the soap operas.

J K Matter
*Detroit, Mich*

AS THE OLD SAYING GOES, you can't mix oil and water. The same thing applies to affairs of the shop and the social world—those gatherings where the wives of the men congregate periodically to show off their new duds and exercise their right of careful speech.

There is nothing that the dear little woman delights in more than to lay the jam on thick gasconading the superior merits of her precious Orville regardless of his status in the shop. But I suppose we have to be lenient with the little butterflies, and put up with a few things detrimental to our interests.

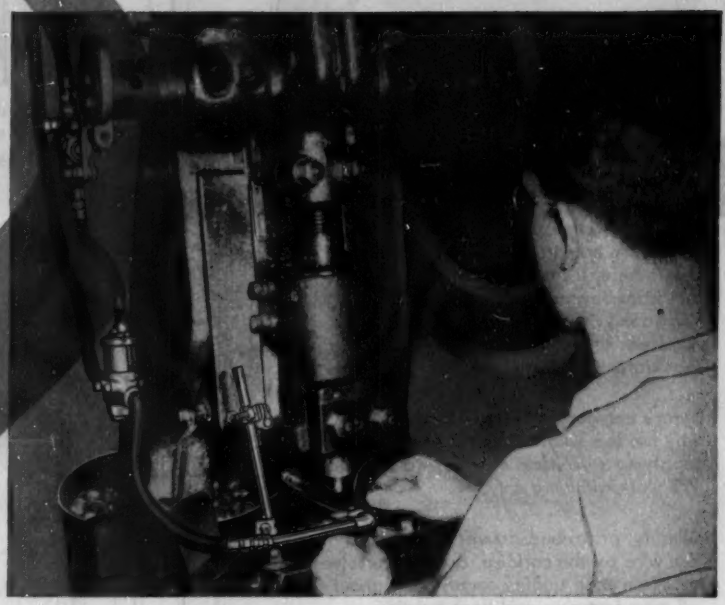
I made a study of shop gossip, and the detrimental effect of carrying tales to be spread across the supper table. In my younger days I found that even to mention anything of a belligerent nature to my wife would only fan the fire within myself and kindle dry leaves in other minds. Don't gloat over disharmony, my shop pals, as it has a resiliency that will slap back at you sooner or later.

The more a man tells his wife of things of a disagreeable nature that have happened in the shop the more he is going to receive her support and the more he is going to feel that he is right. You will find that which at first appeared as an unsolvable problem can be settled in a few minutes—if you don't take your troubles home. Usually problems are caused by misunderstanding. Pride and bullheadedness are the root of evil.

To get back to the original question as to whether Al can afford to talk to his men who have indication of gripes: Straight, honest-to-goodness approach denotes strength of character. To be honest with your men does not mean you will lose face. The reason you are a foreman, Al, is because you have superiority in judgment or some other would beat you to it. Show your men that you are not afraid to face the issue.

John Homewood
*Burbank, Calif*

# how much can air ejection boost your production

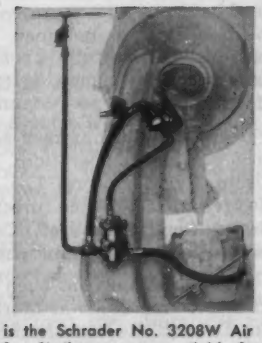


Actually, it can *double production.* With Schrader Air Ejection Sets on your presses, after each press cycle, there's a quick puff of air—automatically timed to do the job just right—and you're set for the next blank to be inserted.

**No more tedious, dangerous hand removal!**
**No more wasteful steady air blasts!**

Schrader Air Ejection Sets come in many types to suit any need. You can buy them for cam operation off the crankshaft, or for roller tripper actuation from the ram. If the parts you are fabricating are too heavy to be blown from the dies by an air blast, the Schrader Cylinder Knockout Set is available, which utilizes the knockout force available from a push-type Schrader Cylinder.

But regardless of the type of ejection set you need, you'll find one exactly suited to your requirements at Schrader. Schrader Air Ejection Sets come complete with all necessary fittings, valves, hose and air line accessories—all ready to be bolted to your press. Write today for full details.



This is the Schrader No. 3208W Air Ejection Set. Similar sets are available for cam or tripper operation, with or without pilot valve timing.

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***Before competition creeps up too close*** why not see what we can do for you, in supplying wire items in which we specialize? *We work with wire only.*

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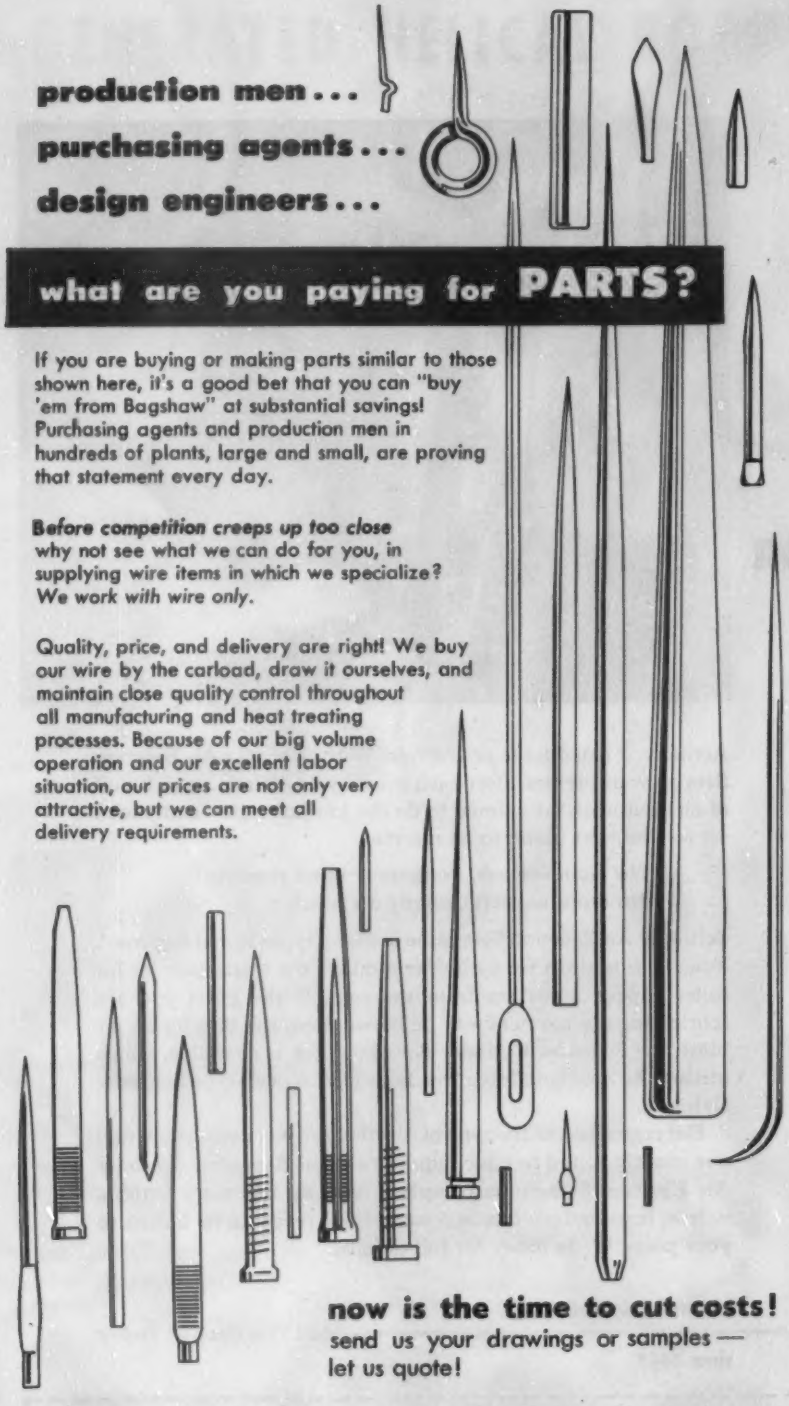

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*for pointed, square-cut, or formed wire goods*
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# Names in the News...

**Clem K Cole** has been named chief manufacturing engineer for Royal Jet, Inc, Alhambra, Calif, manufacturer of heating equipment. **Burchard W Wilson** has been made chief engineer in charge of experimental and development work.

**Stanley J Roush** has been named president and general manager of Morse Chain Co, a subsidiary of Borg-Warner Corp. He succeeds **Frank M Hawley**, elected chairman of the board. Mr Roush is also president of the Atkins Saw Div of Borg-Warner, a position which he retains.

**Leo Buchine** has been appointed vice president and general manager in charge of manufacturing at the Industrial Washing Machine Corp, Matawan, NJ, manufacturer of specially designed machines for cleaning metals, and other products. Mr Buchine was formerly associated with the Morrison Steel Co, New Brunswick, NJ.

**Allen H Whitehead** has been appointed manager of Metal Goods Corp's Nickel & Nickel Alloy Div. For the past eight years Mr Whitehead has been sales representative in the New Orleans territory. His new headquarters will be at the company's general offices in St Louis, Mo.

**Barry B Willis** has been appointed vice president, operations, of Pastushin Aviation Corp, Los Angeles. He resigned as vice president of Grand Central Aircraft Co, Glendale, to assume his new position.

**Clayton L Jones** has been appointed master mechanic at Morse Chain Co, Detroit. He was formerly vice president, manufacturing, for Hage Industrial Corp, Toledo, Ohio.

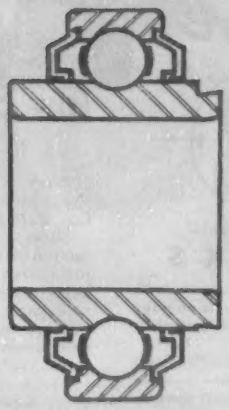
**Louis S Kutscher** has been appointed sales manager for the metalworking tool, and record dies and accessories divisions of the Barnaby Manufacturing Co, Bridgeport, Conn. He was formerly associated with the engineering and sales departments of E W Bliss, Brooklyn, and General Electric Co, Bridgeport, Conn.

**Richard E White** has been appointed general manager, and **Charles O Bartley** works manager of Mission Manufacturing Co, Houston, Texas, oil tool manufacturing firm. Mr White has been with the company since 1938; he has been works manager for the past six years. Mr Bartley has been production superintendent since 1949.

*preference points on power transmission units*

## Seals that are

# EFFECTIVE . . FRICTIONLESS



The Mechani-Seal consists of two "dished" steel plates. The inner member is fixed securely in the outer ring. The outer member is pressed on the outside diameter of the inner ring.

For applications where the bearing must be thoroughly protected against the entrance of foreign matter, or where grease must be absolutely retained within the bearing, the Fafnir Mechani-Seal Bearing offers definite advantages. This is the bearing you'll find in most Fafnir Ball Bearing Power Transmission Units.

The labyrinth design of the Fafnir-originated Mechani-Seal provides an inner trap seal for grease retention and an external rotating slinger for dirt exclusion. Close, but definite clearances between various seal members permit the bearing to "breathe". What's more, they insure it against drag, either in starting or running . . . no rubbing to introduce friction . . . no wear. Seals are integral with the bearing, are not subject to fouling or misalignment, and are corrosion and rust resistant.

When you compare design features, point for point, you can readily understand why the preference is for Fafnir Ball Bearing Power Transmission Units. For more details and a complete description of Fafnir Power Transmission Units call your Fafnir Representative. The Fafnir Bearing Company, New Britain, Conn.

**WIDE INNER RING BALL BEARINGS**
. . . with Mechani-Seals

**PILLOW BLOCKS**
. . . standard and heavy series

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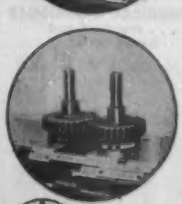
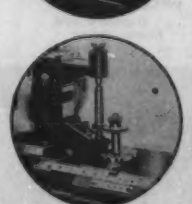
*The Rolling Test is Practical Common Sense*

- Indicates RUN-OUT, CENTER DISTANCE by 1/1000 vernier, BACKLASH, TOOTH JUMP, etc.
- It catches the error directly in the shop where the gears are cut.

The MODEL B shown takes in SPUR WORM SPIRAL and BEVEL GEARS from 1/4" to 9" Center Distance

STUDY THESE PICTURES and reflect how ingeniously and simple every gear problem has been solved, including pinions with shaft, small gear 1/2" center distance, worm gears, spiral gears and even bevel gears. All without extra attachments.





NOTE that in the PARKSON the tests are being made on fixed arbors or studs avoiding rotating shafts or bearings liable to introduce errors not in the gears themselves.

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SELECTED INDUSTRIAL FILMS — SHOP PRACTICE AND MACHINE TOOLS. FILE NO. 111361.. *Published by US Dep't of Commerce, Washington 25, DC. 26 pages, 8 x 10½ in. Paper bound. Price $1.*

If you are looking for sources for industrial motion picture and slide films, this will be the best dollar you have ever spent. The book lists over 200 films and gives a brief description of the subject matter of each. For easy reference, films are classified into 13 divisions, as Bench Work, Boring Mills, Broaching, Cutting Tools, Drilling, Gear Machinery, Grinding, Lathes, Milling Operations, Miscellaneous, Planers, Punch Press, and Shapers. There is also an index of film titles and a directory of sources.

Sponsored jointly by the Dep't of Commerce and the Small Business Administration, the publication reflects a great deal of credit on the individuals responsible for its production.

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SHELL MOLDING AND YOU — *Produced by General Electric Co, Chemical Materials Dep't, 1 Plastics Ave, Pittsfield, Mass. 35-mm, color sound slidefilm. Running time 25 min.*

Designed to acquaint foundrymen and buyers of foundry products with the benefits of this new casting process, this slidefilm describes the advantages of shell molding over other casting methods. It affords a step-by-step demonstration of shell-molding operations at GE's new experimental foundry in Pittsfield.

Included in the presentation is a brief, interesting history of metal casting in cartoon form, showing how shell molding fits into the evolution of metal-casting techniques. The film offers foundrymen an opportunity to learn the basic steps in the process, and gives an explanation of the materials and equipment required.

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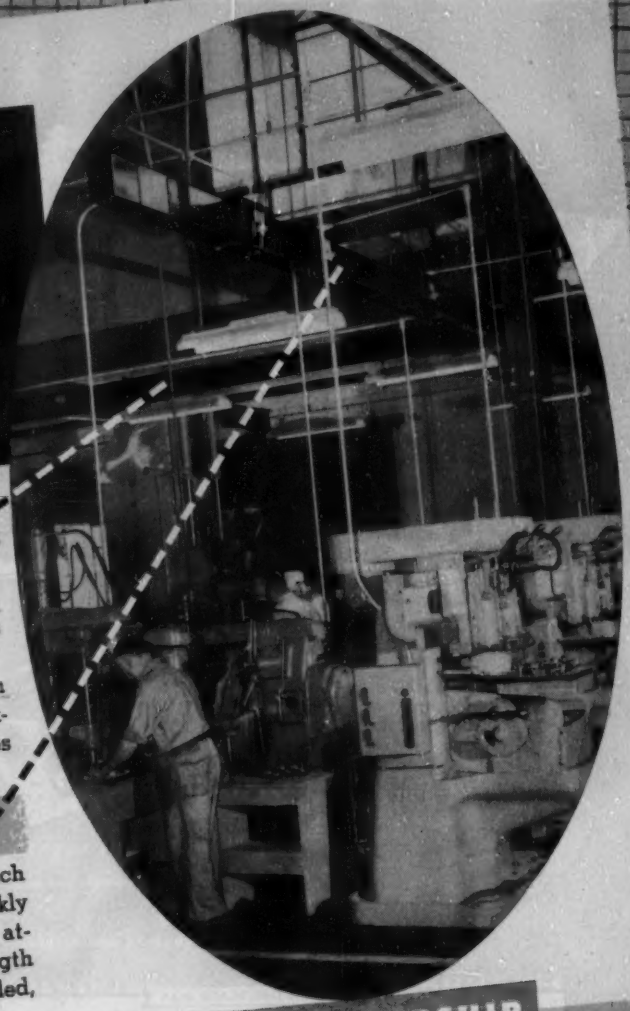

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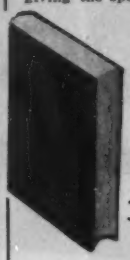

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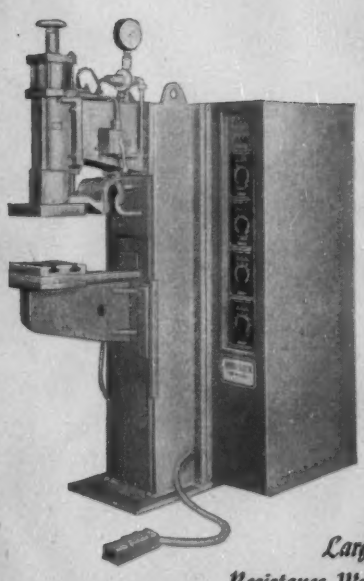

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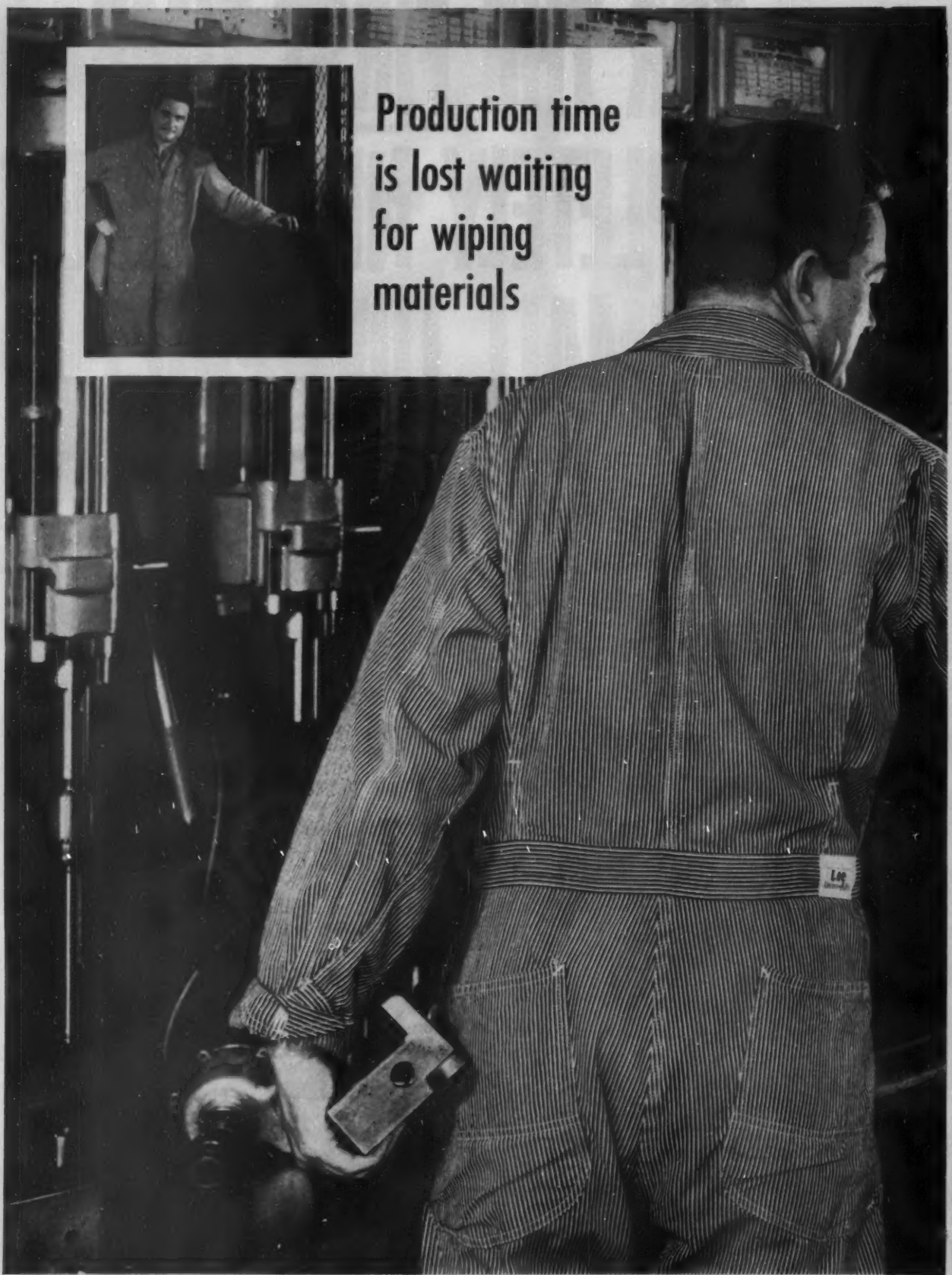
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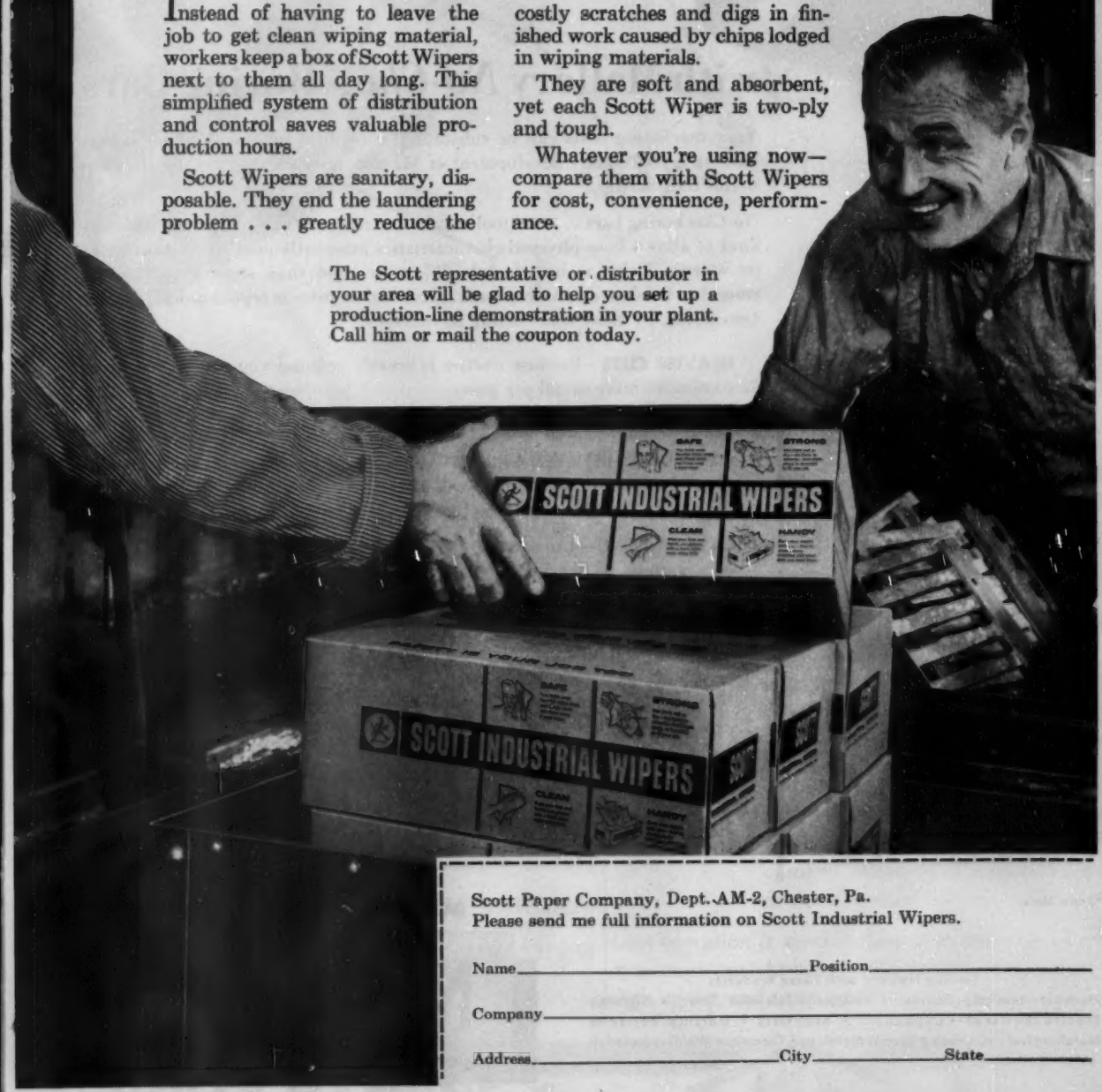


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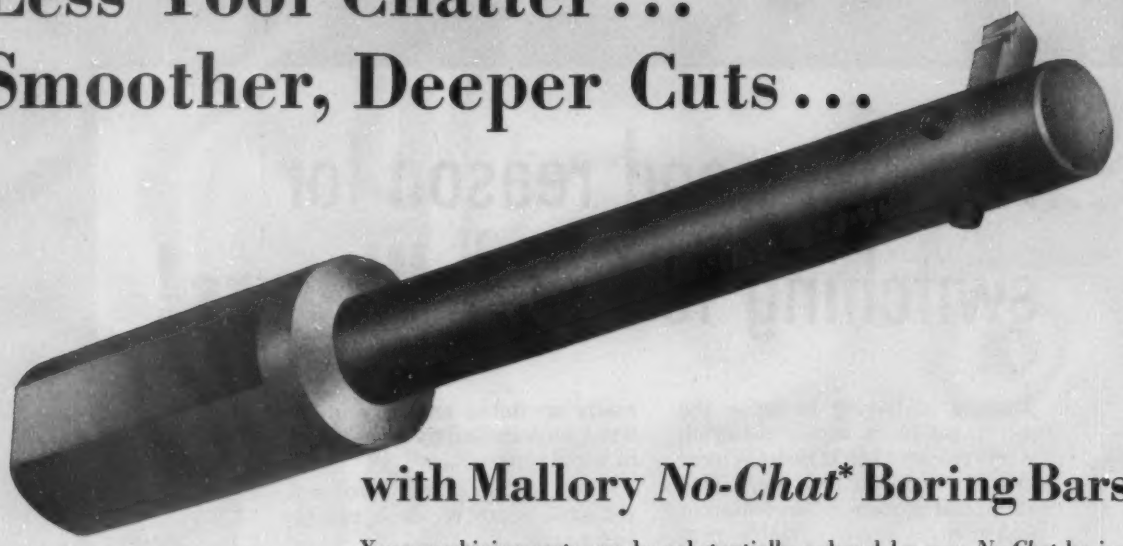

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*No-Chat* boring bars . . . and tool shanks . . . are made of a completely different kind of alloy whose physical characteristics inherently stop tool vibration at its source. Twice as heavy and 75% more rigid than steel, they produce smoother finish even on deep cuts. Their higher price is repaid quickly, many times over, by these cost-cutting advantages:

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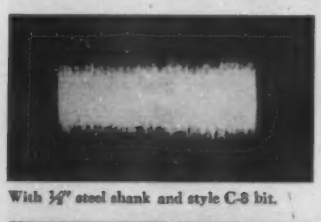
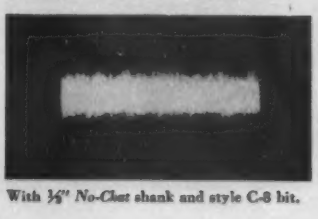
### TESTS PROVE HOW *NO-CHAT* REDUCES CHATTER

These oscillograms show the greatly reduced amplitude of tool vibration with *No-Chat* shanks, using identical machine set-ups, when taking a 0.030" cut in low carbon cold rolled steel at 450 SFPM.



With ½" steel shank and style C-8 bit.



With ½" *No-Chat* shank and style C-8 bit.

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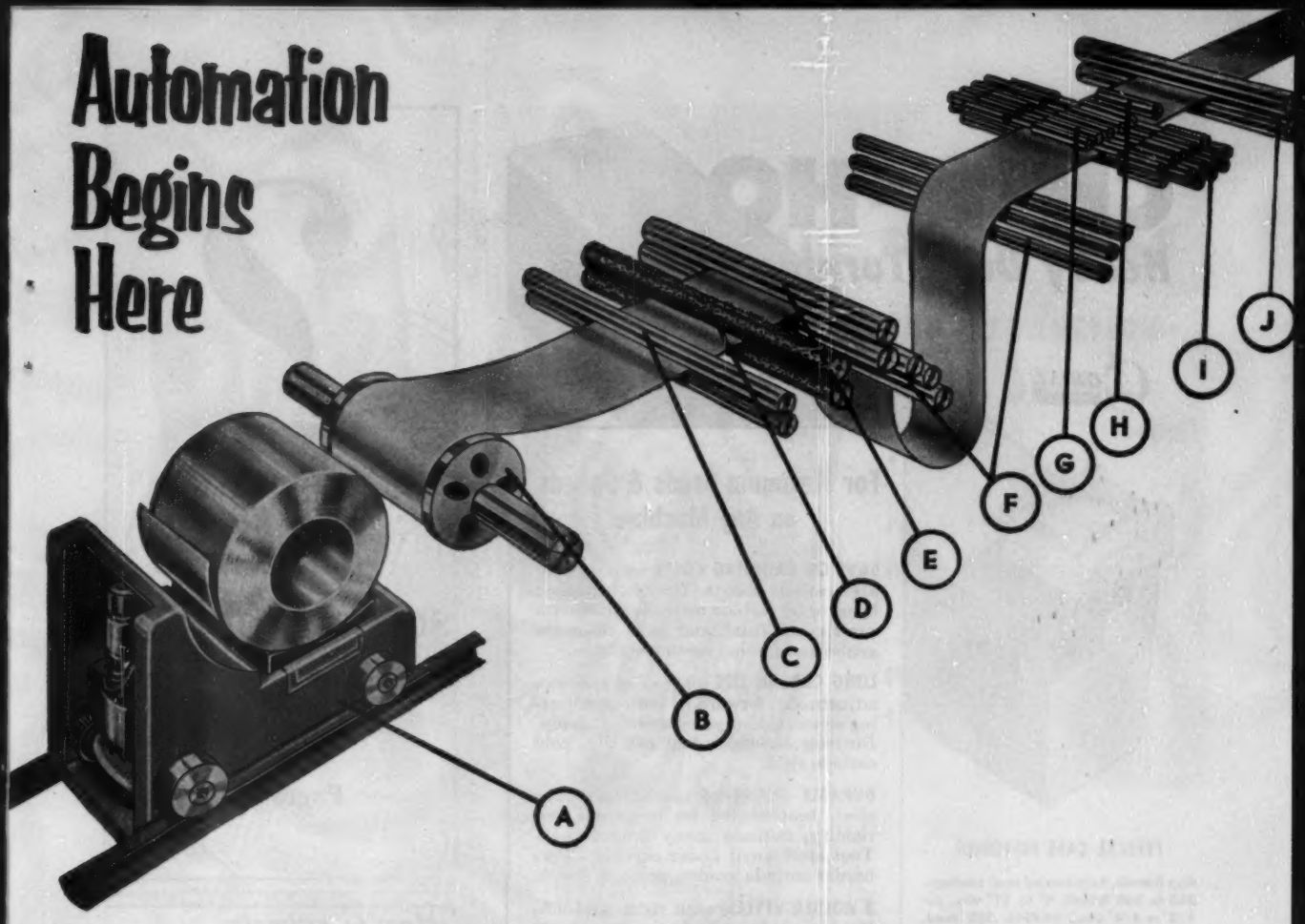
# Automation Begins Here




Automation—the automatic handling of work in process — permits manufacturers to combat high labor and material costs by boosting man-hour production. McKay has played a large part in this movement by designing and building "automated" equipment for the automotive and steel fabricating industries.

For example, coil feed lines of the type illustrated above were designed and built by McKay for several leading automotive firms. They are used to automatically feed coil stock into square shears or blanking presses, thus eliminating inefficient and laborious methods of manually feeding these machines.

**TYPICAL LINE EQUIPMENT**

**(A)** Hydraulic Loading Car for stand-by coil.

**(B)** Cone Type Coil Holder handles wide range of coil I.D.'s and O.D.'s.

**(C)** Guide Rolls to direct strip into brush rolls.

**(D)** Brush Rolls with solvent sprays to clean strip.

**(E)** Driven Pinch Rolls for pulling coil stock and filling storage loop.

**(F)** Guide Rolls to support loop.

**(G, I, J & H)** Feeder unit consisting of Backed-Up Leveler **(G-I)** and pinch rolls **(J)** is powered by D.C. drive which is controlled by a measuring device driven from measuring rolls **(H)**. The feeder flattens the strip and accurately measures it into open press dies or through shear knives.

Line operation is synchronized with the press or shear for maximum production. McKay builds these units with design, speed, and capacity dictated by your job requirements.

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YOUNGSTOWN, OHIO

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ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

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**Worm Shafts for Speed Reducers, 4140 SAE steel, 5" dia., cut 3/8" to 1-1/4" deep at 250 SFM, .011" feed.**

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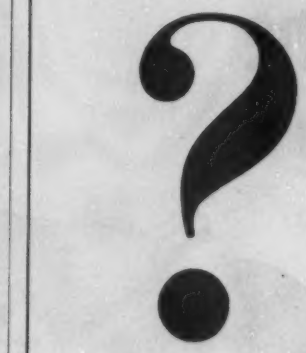
SOME wag said long ago that it isn't smart to step on other men's hands as you go up the ladder—you may need their help coming down. It's just as true that the man who makes his way up by slipping a knife in the back of the man above, spends his time up there ineffectually because he's always got one eye cocked over his shoulder, watching for the knife.





Want more screw machine business?

See Pages 256-257



***How to estimate the time element in any machining job***

Use this manual to make the winning but safe bids that mean more jobs and better profits for your shop.

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BY W. A. NORDHOFF
Douglas Aircraft Company, Inc.

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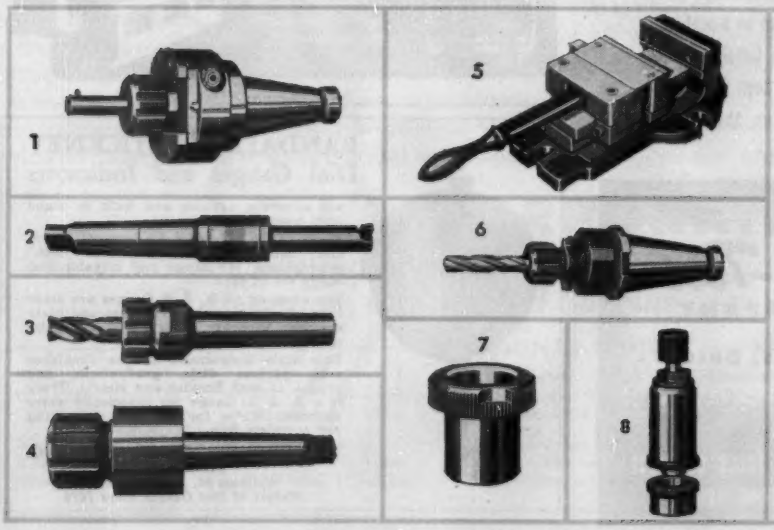


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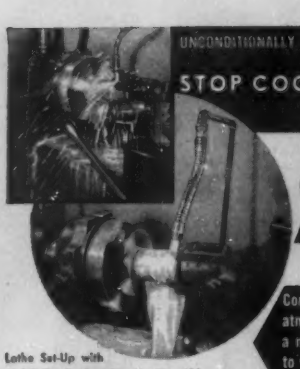

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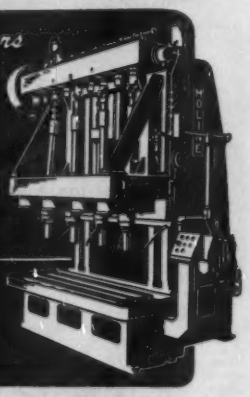

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*POWRWORKER* "26" Pallet Truck
4000 and 6000 lbs. capacity
Also available as platform or tilting fork stacker

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Remove 4 bolts and slip off the one-piece cover; the complete hydraulic sub-assembly is exposed. Hydraulic motor, pump, oil reservoir, valve assembly and self-aligning cylinders are immediately accessible and ample space is provided for quick inspection or removal.

**POWER HEAD READY-TO-WORK-ON IN 2 MINUTES . . .**

Split cover allows complete accessibility to the drive motor, brakes, resistor and control panel by merely removing 7 screws. Revolving head permits servicing any side of the power head without further dis-assembly. For major overhaul, the whole unit can be removed in 17 minutes.

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***The POWRWORKER "26" is only 26 inches longer than the load . . . the shortest standard truck on the market!**

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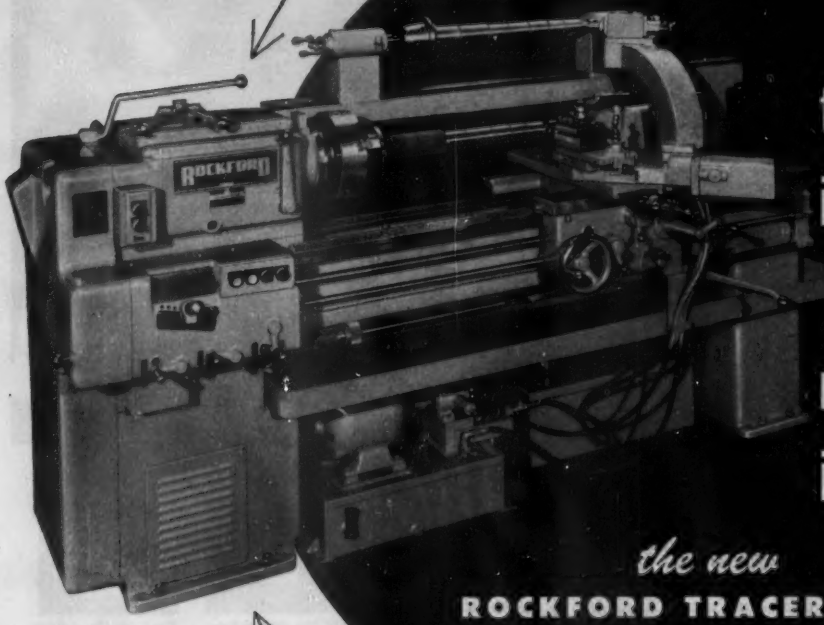


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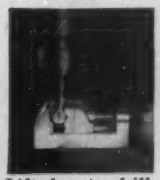
Give *Start-to-finish* work holding

Off the swivel base, end down for accurate marking.

Back on the swivel base, at the bench, for center punching.



Lifted onto drill press, still accurately in position.

Held in same position but moved to milling machine.

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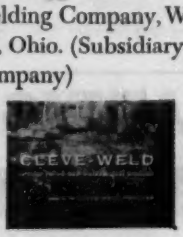
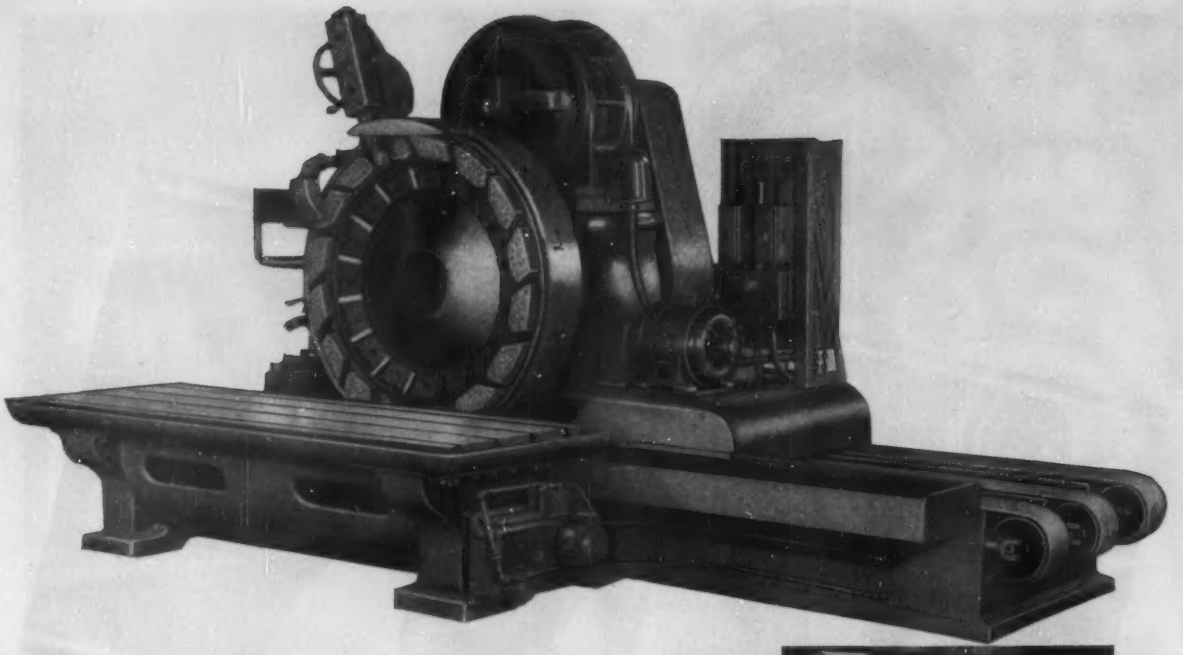
**This illustrated brochure shows our facilities and describes what the Cleve-Weld Process is and does. Write for it.**





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If your work consists of long or bulky parts, Mattison UK Traveling Wheel Grinders will finish them at a surprising rate of speed and accuracy and at very low cost. Large and awkward shaped pieces are frequently ground in a good deal less time than previous method. The part, no matter how large, is clamped in a stationary position and the grinding wheel passes across the surface to be finished. Amount of floor space needed is little more than half that required by traveling table machines of equal capacity. The operator's position on the carriage, together with the convenient grouping of all controls, makes for utmost grinding accuracy and speed regardless of the size of the job.

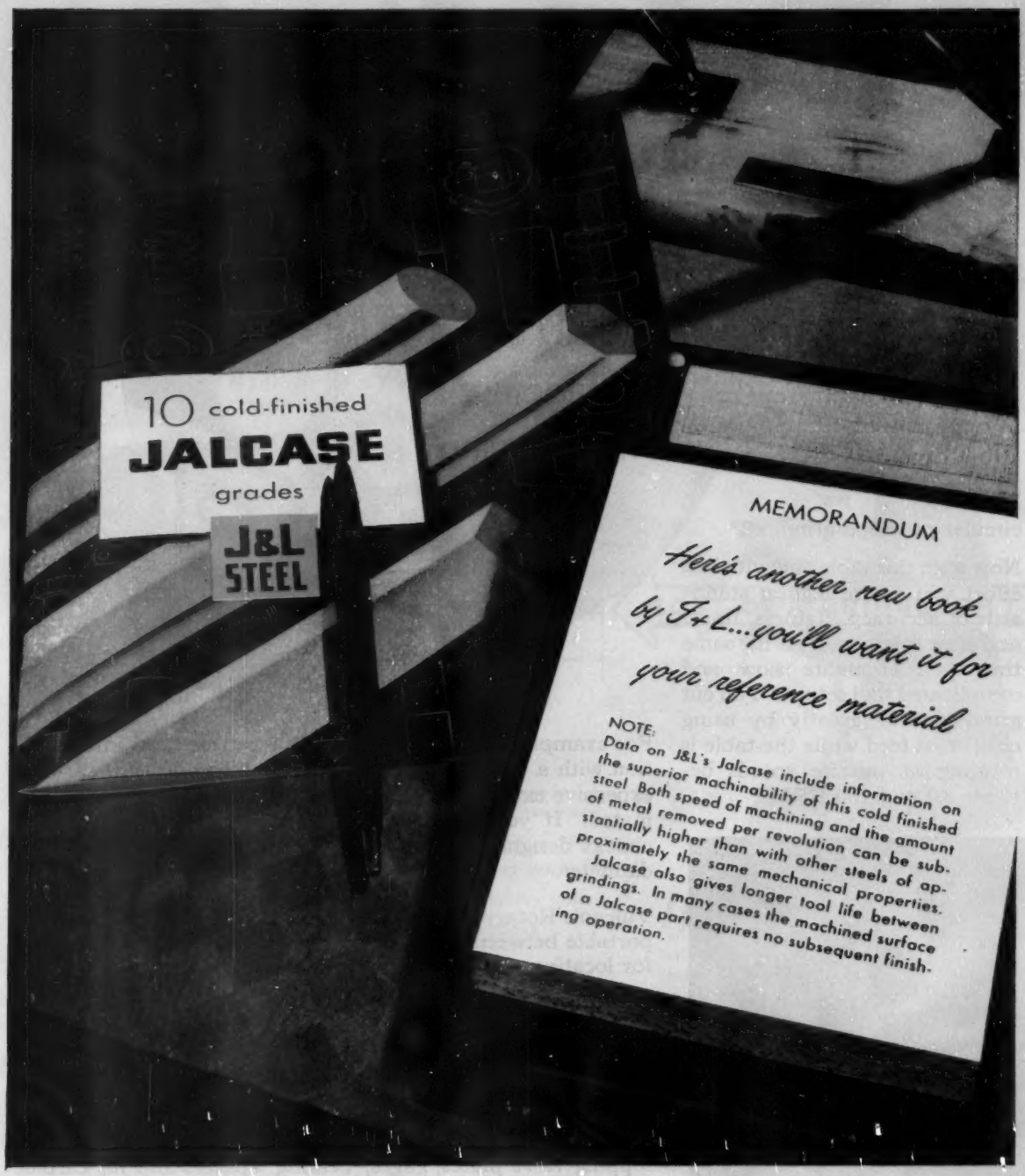
For further information, send for new free circular No. 844-2 RM covering this machine.

**The operator rides the carriage of the UK Traveling Wheel Grinder. From this position he gets a safe unobstructed view of the grinding wheel at point of contact and can observe the work at all times.**

**Heavy work of practically any length can be rapidly ground to close tolerances with no more power required than for lighter work — the UK's table is always stationary. Picture shows end of 35' base being ground.**

**MATTISON MACHINE WORKS**

ROCKFORD · ILLINOIS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Here's another new book by J+L...you'll want it for your reference material
NOTE:
Data on J&L's Jalcase include information on the superior machinability of this cold finished steel. Both speed of machining and the amount of metal removed per revolution can be substantially higher than with other steels of approximately the same mechanical properties. Jalcase also gives longer tool life between grindings. In many cases the machined surface of a Jalcase part requires no subsequent finishing operation.

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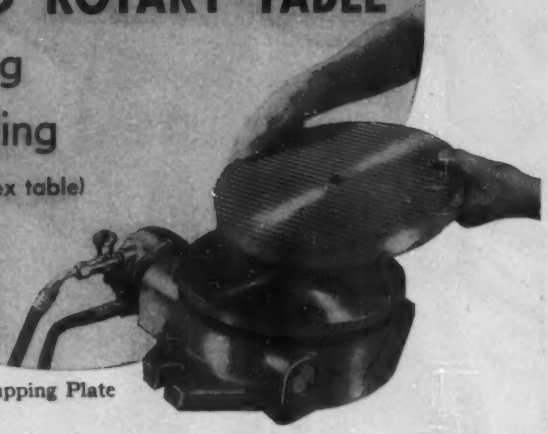
With Permanent Magnetic Chuck

# NEW *Vulcan* MOTORIZED ROTARY TABLE

## for lapping and grinding

(not an index table)



With Lapping Plate

**FASTER**
circular precision grinding!

Now with this table and with less effort you assure highest standards of accuracy, flatness, finish and close tolerances. At the same time you eliminate slow and complicated tool setups. You cut grinding time greatly by using only cross feed while the table is rotating at infinite speeds between 40 and 100 RPM.

For example, Vulcan's Rotary Table can be used in connection with a sine plate or angle fixture. The dressing of large expensive external wheels for side grinding is therefore eliminated. If you wish we can provide permanent magnetic chucks designed for use with our table, both 6" and 10" in diameter.

Vulcan's Rotary Table is an air operated, self contained unit, portable between bench or machine. A precision center hole for locating and tapped holes in the table for clamping provides easy setup. Circular surface grinder applications are many and varied — grind flanged studs or bushings — bearing spacers — forming rolls — cutters — convex or concave surfaces — punches or dies (radius or angle).

Lapping? Yes — and in micro inches. For the 6" and 10" table, lapping plates of 12" and 16" are provided. Perfect for lapping valve plates, gages, bearing spacers and for carbide lapping using diamond powder. *Write for circular.*

Work clamped to motorized table, mounted on sine plate. Surface grinder application.

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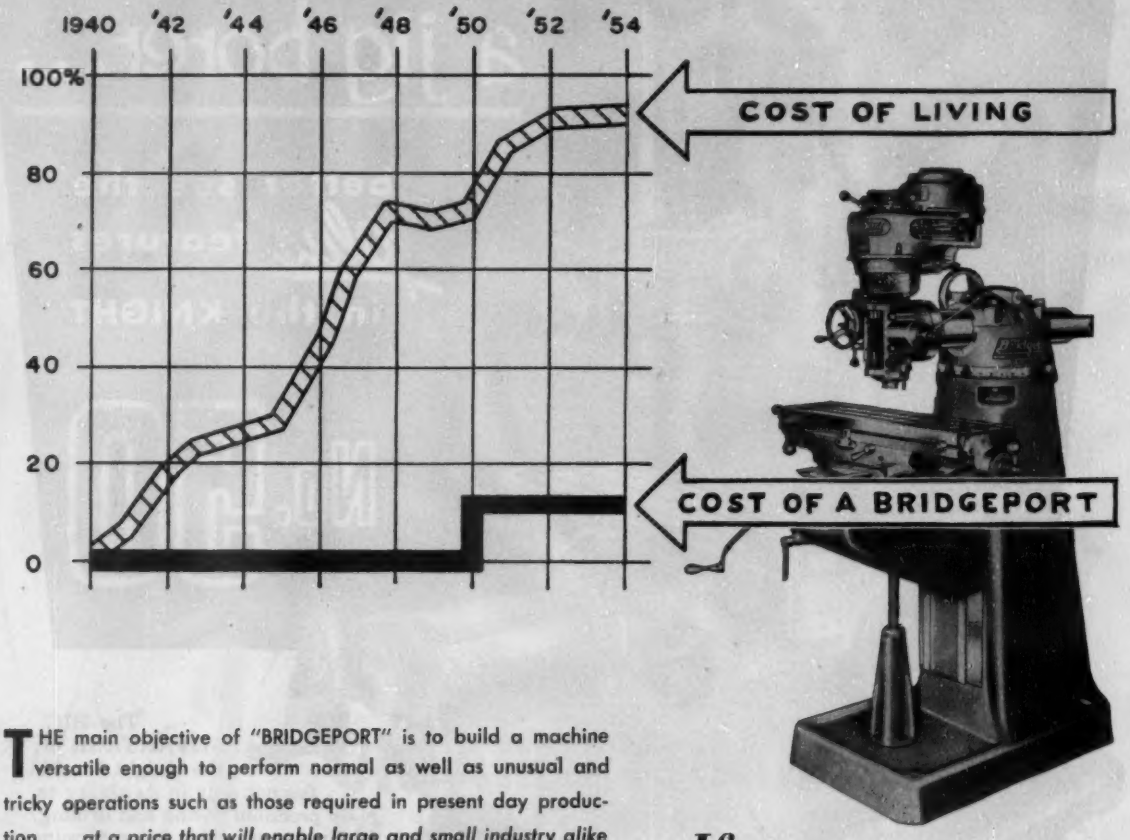
# *Holding the Price Line!*




THE main objective of "BRIDGEPORT" is to build a machine versatile enough to perform normal as well as unusual and tricky operations such as those required in present day production . . . *at a price that will enable large and small industry alike to take advantage of its inherent and exclusive advantages.*

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*. . . you could buy the following today . . .*

| | . . . at these prices | . . . instead of these |
|---|---|---|
| Housing | $7850 | $18,000 |
| Automobile | 913 | 2,046 |
| Food | 727 | 1,500 |
| Apparel | 280 | 500 |
| Fuel, Electricity | 224 | 300 |

***Ask your dealer . . . or us . . . to show how by "holding the price line", shops both large and small have been able to modernize their production through the more than 20,000 "BRIDGEPORTS" shipped in the past 16 years.***

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Bridgeport, Connecticut

*Manufacturers of High Speed Milling Attachments and Turret Milling Machines*

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## better see the *plus* features in the KNIGHT

# No. 50

**SPECIFICATIONS**

- Spindle speeds, 16—40 to 2000 RPM
- Boring feeds, —infinitely variable. .0000"—.010"
- Vertical capacity—28"
- Table travel—longitudinal 28", cross 18"
- Table feeds—dial type, 16
- Table feeds—per minute, 5 .16" to 20"
- Table rapid traverse—both directions, 100"
- Horsepower—7½
- Weight—8100 lbs.

The BIG ADVANTAGE of the Knight No. 50 lies not only in its ability to do precision boring and drilling, but in its versatility for performing a wide range of other difficult milling and machining operations without transferring the workpiece from one machine to another. Much of the layout work and preliminary drilling are eliminated, and the whole job is finished quicker on the No. 50.

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Name.....

Title.....

☐ Send data on Knight's 20" & 42" Rotary Tables.

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Ask for the Yoder Slitter Book. It contains cost studies, time studies, information on scrap disposal, coil handling, small versus large slitters, and many other subjects of interest to users of coiled strip and sheets.

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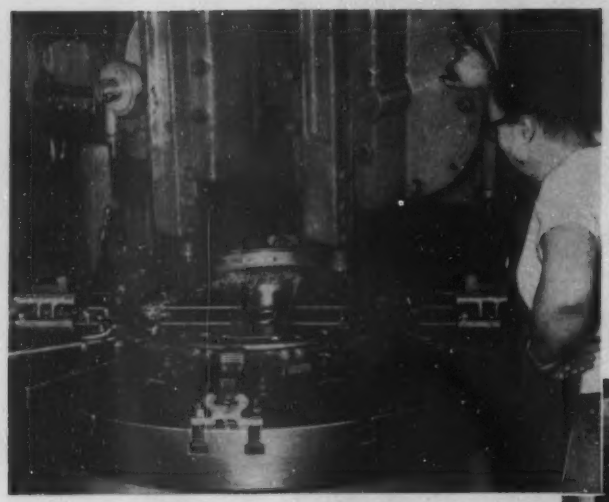
# Impact Resistance Helped These Jobs PAY OFF



### 6 TIMES MORE RINGS PER GRIND

HAYNES STELLITE 98M2 alloy tools machine six of these stainless steel rings per grind. They remove 55 cubic inches of metal in 15 minutes while making interrupted cuts across two weld seams, 12 bolted sectors, and 36 bolt holes. Tools previously used failed before one ring was finished. The metal being machined is 321 stainless steel. The depth of cut is ¼ inch, and the speed is 160 revolutions per minute.

### 40 PER CENT MORE CASTINGS PER GRIND

20 cubic inches of metal per minute are removed from this 18-8 stainless steel casting by HAYNES STELLITE 98M2 alloy tools. The tools make 18 interrupted cuts per revolution as they machine the entire face of this 54 inch casting. Despite the severe operating conditions, HAYNES STELLITE tools turned out 40 per cent more castings per grind than any other tools tested. Cutting speed is 100 surface feet per minute, the depth of cut averaged ¼ in., and the feed is 1/16 in. per revolution. No lubricant was used.

### IMPACT RESISTANCE PLUS RED HARDNESS

The ability of HAYNES STELLITE tools to resist impact from intermittent and irregular cuts, chatter, and shock loading, is the main reason they were successful on these jobs. The tools are hard, too, and retain their hardness at red heat. This combination of properties guarantees fast metal removal; makes deep cuts at heavy feeds possible even under the toughest conditions.

A manual on cutting tool practice has been prepared to help you use HAYNES STELLITE tools to advantage. Write to any of our District Offices listed below for your free copy.

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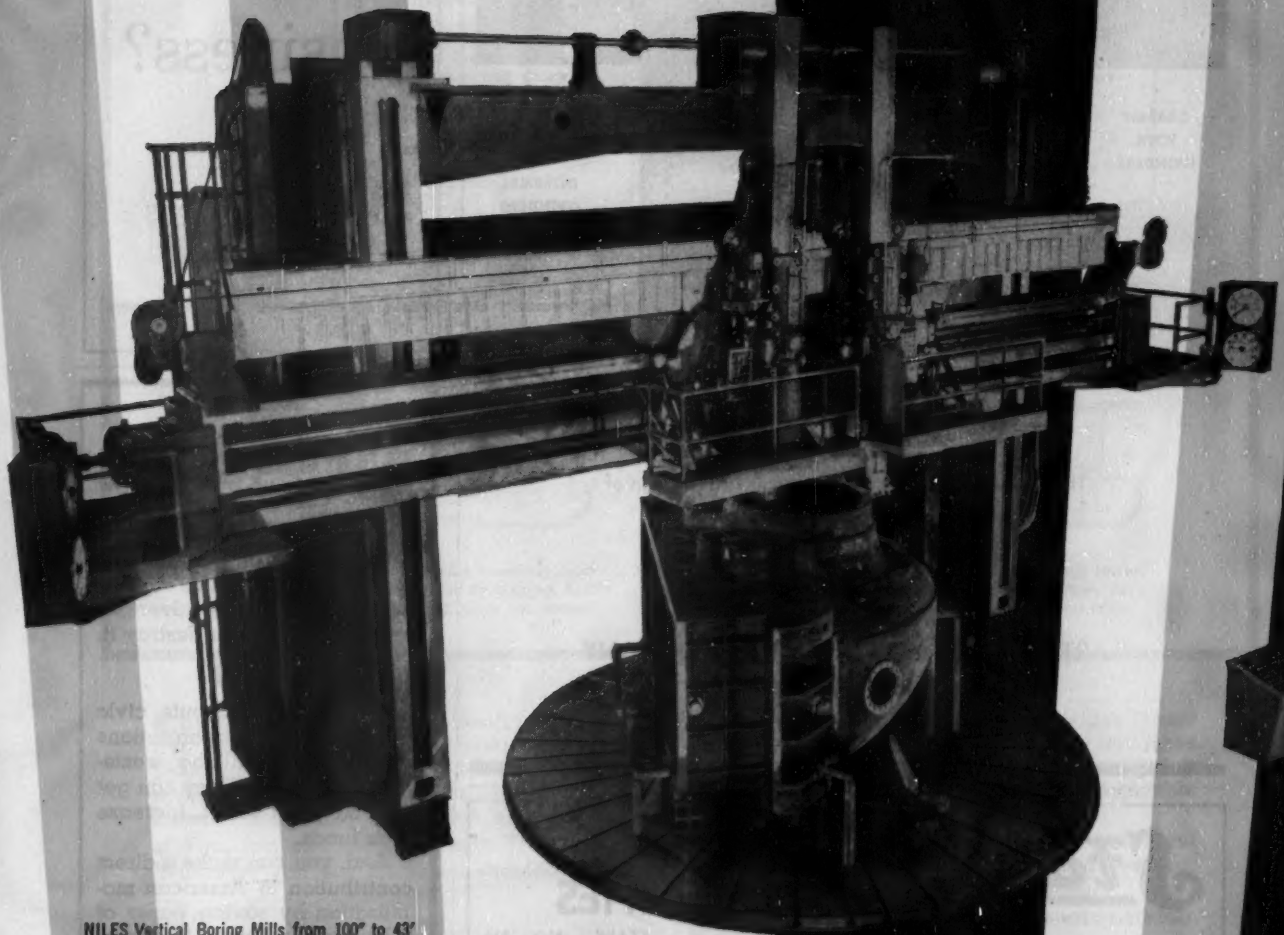

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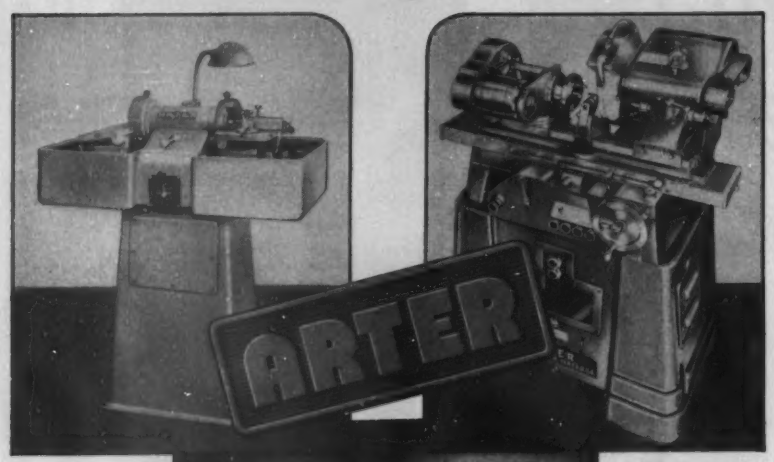
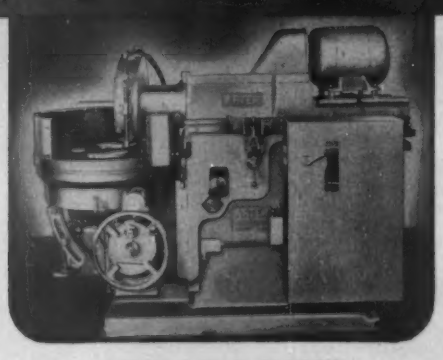



CARBIDE TOOL GRINDERS



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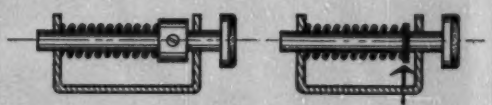
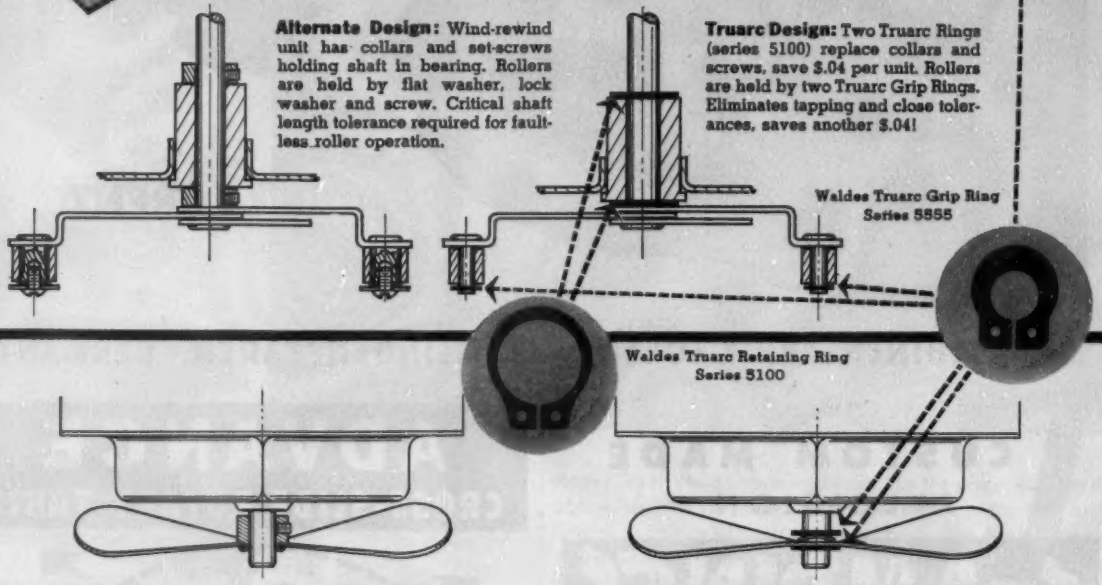
**Alternate Design:** Pressure Pad Assembly. Collar and set screw secure pressure bar and spring.

**Truarc Design:** Truarc Grip Ring replaces collar, reduces size of assembly, saves $.02/unit.



**Alternate Design:** Wind-rewind unit has collars and set-screws holding shaft in bearing. Rollers are held by flat washer, lock washer and screw. Critical shaft length tolerance required for faultless roller operation.

**Truarc Design:** Two Truarc Rings (series 5100) replace collars and screws, save $.04 per unit. Rollers are held by two Truarc Grip Rings. Eliminates tapping and close tolerances, saves another $.04!




**Alternate Design:** In motor-fan assembly, hub is secured rigidly to fan blades by staking. Fan assembly is secured to shaft with set screw.

**Truarc Design:** Two Truarc Grip Rings (series 5555) plus spring-type bowed washer save $.07 per unit...allow fan to slip if obstructed.

■ By using Waldes Truarc Retaining Rings in five sub-assemblies (three shown above), the Telectrosonic Corp. of Long Island City, N. Y., saves a total of $.23 per unit...by eliminating material, machining and skilled labor costs.

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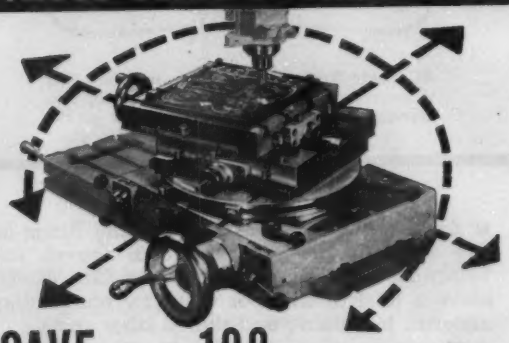

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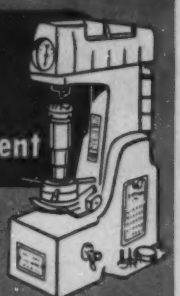

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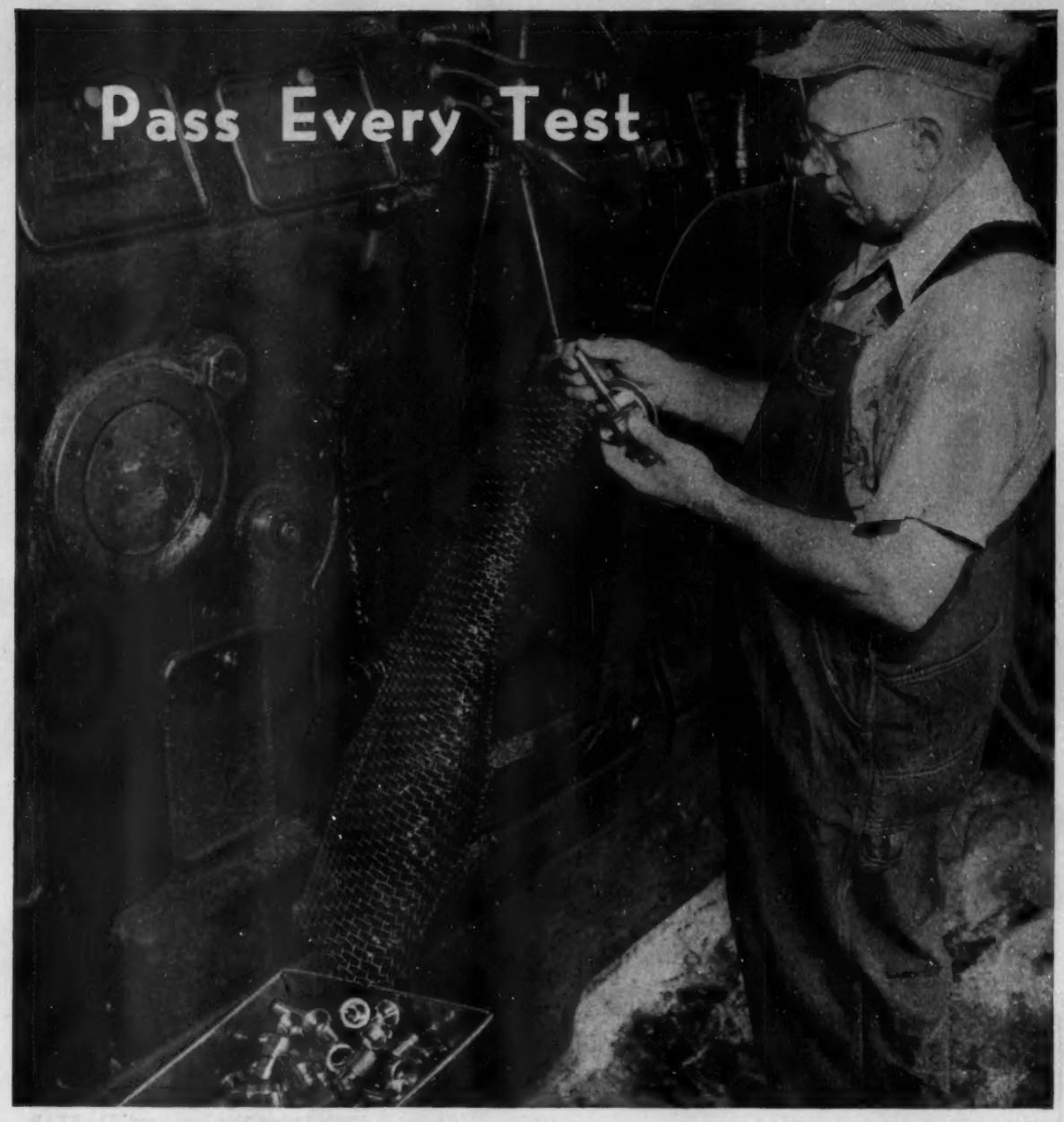


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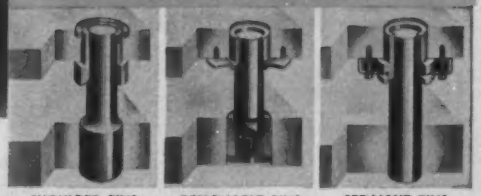

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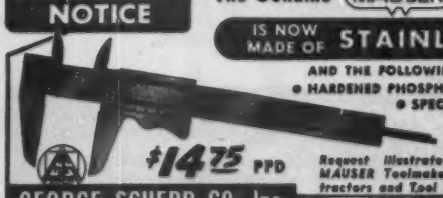

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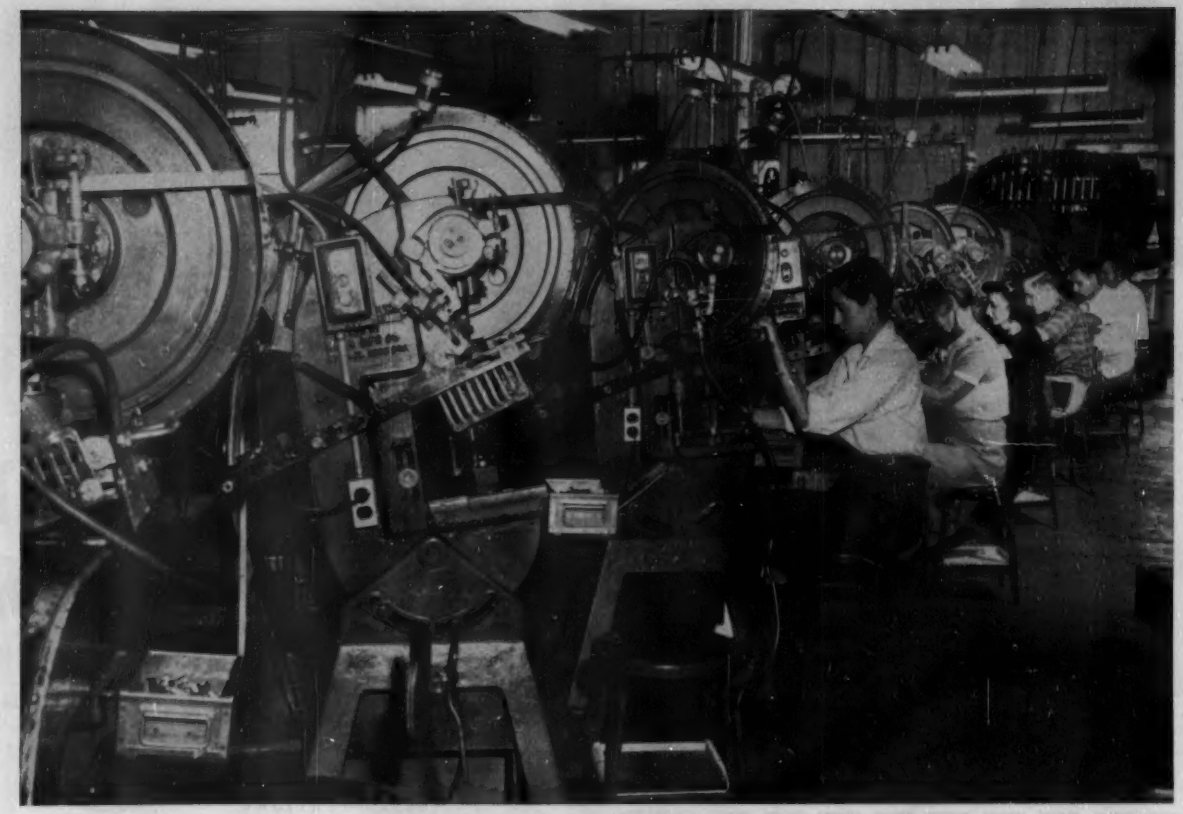

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*Write today* for Free bulletin describing the complete line of Press-Rite Presses from 5 to 85 tons capacity.

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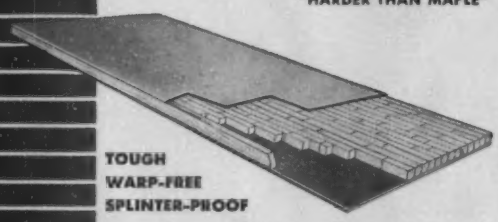

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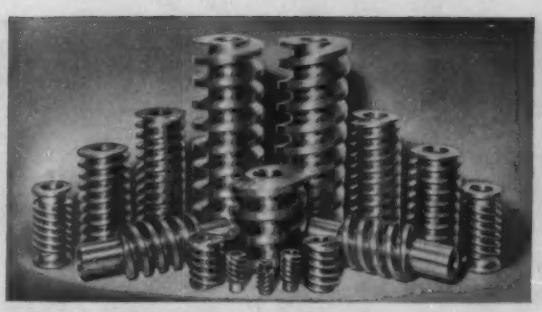

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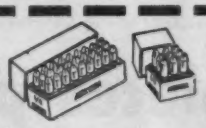

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ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

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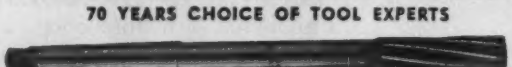

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The cylindrical plungers in the Waltham Sub-Presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

*Overhang*

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# NEW Ettco-Emrick TAPPING ATTACHMENTS

## THEY RUN IN OIL!

1. All parts and a patented cooling system clutch, run in a pumped oil bath which is factory sealed . . . resulting in smooth, trouble-free service.
2. Feature for feature, there are no finer tapping attachments made . . . at any price!

For speed, you just can't beat these new tappers. They combine every feature needed to operate at topmost production speeds, including a rigid chuck spindle supported at both ends by oilite bushings and a new indestructible friction material.

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for full details on sizes, capacities and prices.

**ETTCO TOOL CO., INC.**
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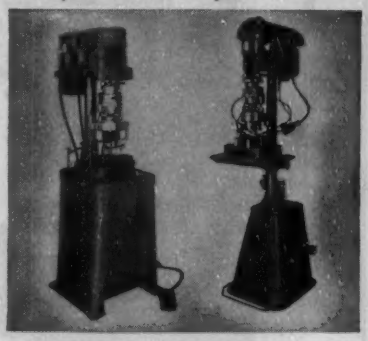
He's been carefully selected for his technical know-how, his integrity and financial soundness. As a local businessman who depends on your support, he has a personal interest in providing a satisfactory answer to your problems and in giving you fast, efficient service.


## DRILLING and TAPPING EQUIPMENT NEWS

### Tapping Machines Boost Multiple Head Output



Ettco-Emrick tapping machines are designed for automatic or semi-automatic operation with multiple spindle drilling or tapping heads and single spindle tapping attachments. The No. 72A machine is foot or air-operated. The No. 74 machine is air operated and electrically controlled. *Details in Bulletins No. 72A and No. 74. Write Ettco Tool Co., 590 Johnson Avenue, Brooklyn 37, N. Y.*

### Electric Indexing Fixture Has Fast, Precise Action

Ettco-Emrick Indexing Fixtures provide smooth, shockless, positive action. Can be used on any machine base. Synchronization of index fixture with outside machine member is electrically controlled. Utilizes interchangeable nesting plates ranging from 10" to 14" in diameter. *Details in Bulletin No. 97. Ettco Tool Co., Inc., 590 Johnson Ave., Brooklyn 37, N. Y.*

### Balanced Tap Chuck Insures Greater Accuracy

Balanced construction of this newly designed precision-made Ettco-Emrick tap chuck eliminates "whipping" action and insures greater accuracy. Light weight and small external dimensions minimize spindle inertia on reversing, making it suitable for either light, sensitive work or heavy duty jobs. Only three sizes needed to cover the complete range of tap capacities from No. 0 to 1". *For details, write Ettco Tool Co., Inc., 590 Johnson Ave., Brooklyn 37, N. Y.*

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Illustration shows typical set-up for cutting taper keyways with table tilted.

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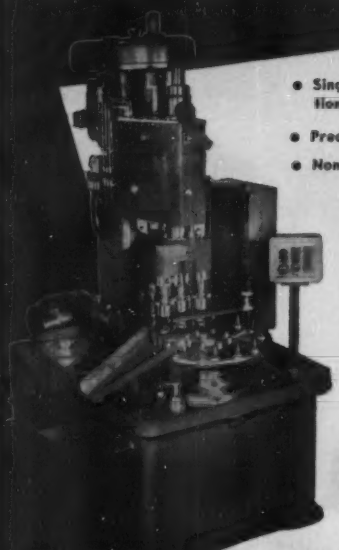
## *TAPPING MACHINES*
BUILT FOR SPECIFIC PRODUCTION JOBS



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- And Many Other, Worthwhile Features

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## ask your tool crib supervisor

Sure you get so fed up with claims and boasts about tools. They all seem plausible enough, but what can you believe? Here's an out! Go check with your tool crib foreman. He'll tell you what air impact wrench is asked for the most. Chances are he'll say "Chicago Pneumatic."

And with good reason, too! The CP-360 above, for example, is well-balanced and a cinch to handle. Designed for faster, low-cost nut running in production line and maintenance, its ease of operation reduces operator fatigue —gets greater work output per operator per day.

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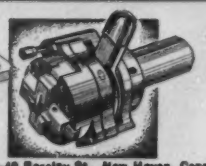

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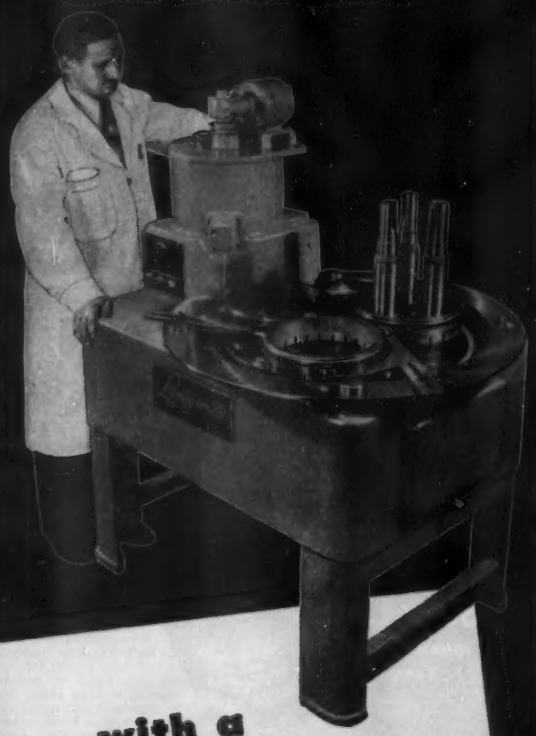
# Lapping For Precision Flatness and Parallelity in Production Quantities



## ...with a LAPMASTER

This is the machine for you if you want precision flatness in production quantities at low cost. Lapmasters readily lap to the extreme close tolerance of one light band (.0000116") or less. In addition they produce an extremely fine finish to as low as 1 RMS. They are available with 12", 24", 48", 72" or 84" lapping plates.

## THIS IS HOW THE LAPMASTER WORKS

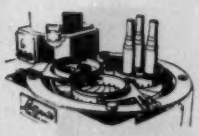
**I,** a heavy cast iron lap plate revolved slowly under power. **II,** large cast iron conditioning rings are held in position and rotate freely on the lap. **III,** work pieces are placed inside the conditioning ring where they also rotate on the lap. **IV,** a liquid vehicle containing fine loose abrasive flows on the lap plate and is uniformly distributed under the work pieces. At the same time the rotating conditioning rings preserve the flatness of the lap plate. These three essential features, combined with the rapid cutting action of loose abrasive produces a flatness which meets every production requirement.

**1** Operator requires no previous lapping experience.

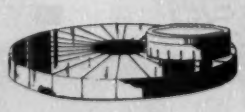
**2** Lapping with loose abrasive and without excessive pressure eliminates heat and subsequent distortion.

**3** Simplicity of design provides accessibility and allows ease of loading and unloading.

**4** Loose abrasive distributed evenly over lapping area insured uniform results.



**5** Precision laps identical parts in one cycle or parts of various shapes, heights and materials in one cycle.



**6** Lap plate always kept in condition while in operation. No down time required for truing or reconditioning.

Learn more about the possibilities of production lapping and the interesting subject of measuring flatness. The illustrated fact-filled booklets are yours for the asking. Write today. AM 11-54

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| MODEL | D6-1 | D6-3 | D8-0 | D8-1 | D8-3 | D10-1 | D10-3 |
|---|---|---|---|---|---|---|---|
| Chuck Size | 6"x18" | 6"x24" | 8"x24" | 8"x24" | 8"x24" | 10"x30" | 10"x30" |
| Wheel Size | 7"x½"x1¼" | 8"x¾"x1¼" | 8"x¾"x1¼" | 10"x¾"x3" | 12"x1"x3" | 12"x1"x3" | 14"x1"x3" |
| Work Height Capacity | 12½" | 12½" | 12½" | 12½" | 12½" | 12½" | 12½" |
| Table Traverse | 7½"x20" | 7½"x26" | 10"x26" | 10"x26" | 10"x26" | 12"x32" | 12"x32" |
| Spindle Motor | Direct 1 HP | Direct 1½ HP | Direct 1½ HP | Belt 3 HP | Belt 5 HP | Belt 5 HP | Belt 5 HP |
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- ☐ Staniar—**Plant Engineering Handbook**—$15.00 (Payable $3.00 in 10 days, $3.00 monthly)
- ☐ Juran—**Quality-Control Handbook**—$12.00 (Payable $4.00 in 10 days, $4.00 monthly)
- ☐ Marks—**Mechanical Engineers' Handbook**—$15.00 (Payable $3.00 in 10 days, $3.00 monthly)
- ☐ Brady—**Materials Handbook**—$9.00
- ☐ ASME—**ASME Handbook: Metal Properties**—$11.00
- ☐ ASME—**ASME Handbook — Metals Engineering — Design**—$11.00

# CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

## EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

**UNDISPLAYED RATE**

$1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count 1 line additional.

POSITION WANTED undisplayed rate is one-half of above, payable in advance.

PROPOSALS $1.50 a line an insertion.

**INFORMATION**

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

**DISPLAYED RATE**

The advertising rate is $12.80 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. A. M.

*NEW ADVERTISEMENTS: Address N.Y. Office, 330 W. 42 St., N.Y. 36, N.Y., for November 22nd issue closing November 8th.*

*REPLIES (Box No.):*
*Address to office nearest you*
*NEW YORK: 330 W. 42 St. (36)*
*CHICAGO: 520 N. Michigan Ave. (11)*
*SAN FRANCISCO: 68 Post St. (4)*

### EMPLOYMENT SERVICE

SALARIED POSITIONS, $5,000 to $35,000. We offer the original personal employment service (established 44 years). Procedure of highest ethical standard is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. Bixby, Inc., 652 Brisbane Bldg., Buffalo 3, N. Y.

### CONTRACT WORK

Want Defense Orders & Subcontracts? "Federal Procurement & Subcontracts Daily" reports advance bid notices. Subcontracts opportunities and contract awards. Previous price reports and nation-wide bid tabulations at no extra cost. Ask for free sample copy. FP&S, 10-42A 47 Road, L. I. City 1, N.Y. ST 4-9284.

### PERIODICALS

Back Volumes of this Journal from 1941 on wanted to buy for cash Ashley. 24 E. 21; NYC (10).

**Are You Seeking or Offering**

**—business**

**—equipment**

**—employment**

**"OPPORTUNITIES"?**

To fill any of these "industry wants" a logical source is found in this Searchlight Section—Classified Advertising.

Experience has shown that the Searchlight Section produces quick results because it spotlights current opportunities of special interest to the readers of AMERICAN MACHINIST—management and production executives in the metal-working industry.

Use "Searchlight"—at low cost—to feature your wants or offerings . . . whether it concerns employment, buying or selling used or surplus new equipment, or other pertinent business "opportunities."

## WANT TO BUY

One 12" 8-spindle, type "D" Bullard "Mult-Au-Matic" arranged for double index, with at least 2 double purpose heads and 2 compound heads.

*Contact Louis Wozar or Kenneth Lung*

**THE DAYTON PUMP & MFG. CO.**
**Dayton 1, Ohio Phone: MI-9871**

**WANTED—SURPLUS ROD & BAR**

Stainless—Aluminum—Steel—Brass. Any size, type and quantity. Cash for termination inventories.

*Send lists to:*

**COLLINS ENGINEERING COMPANY**
**9050 Washington Blvd., Culver City, Calif.**

**WANTED**
**SURPLUS AIRCRAFT PARTS**

or termination inventories. Get our cash offer by return mail.

*Send lists to:*

**COLLINS ENGINEERING COMPANY**
**9050 Washington Blvd., Culver City, Calif.**

## CONTRACT WORK

10 to 12 ft. lengths
ALL METALS
Also Screw Machine Products to Order
**EASTERN**
Machine Screw Corp.
20-40 Barclay St.
New Haven, Conn.
Makers of H & G Die Heads

**BLANCHARD GRINDING**

Have two (2) Grinders #18, with 36" and 42" Chucks. Send drawings for quotation.

**CHOWNING REGULATOR CORP.**
**CORNING, N. Y.**

**PATTERNS in WOOD and METAL**
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them.
**GENERAL PATTERN WORKS**
2233 Buck Street Cincinnati, Ohio

## ASSISTANT TO PRESIDENT

The President of a small machine tool manufacturing company located New York metropolitan area requires a Technical Assistant. Must have following qualifications: Mechanical Engineering education and machine tool background. Duties of position include coordination of sales and manufacturing. The correlation of pertinent data to effect economically sound managerial policies. Salary commensurate to position. Include sufficient personal and business background to justify consideration.

**P-4403, AMERICAN MACHINIST**
**330 W. 42nd St., New York 36, N. Y.**

## POTENTIAL SALES EXECUTIVE

Machine Tool Manufacturer has unusual opportunity. Position requires the following requisites: Mechanical Engineering education, sales experience in machine tool field and proven ability to organize and direct sales staff. Suitable salary. Plant is located in New York metropolitan area. Submit complete personal and business summary with application.

**SW-4405, AMERICAN MACHINIST**
**330 W. 42nd St., New York 36, N. Y.**

**WANTED**
**MACHINERY SALES ENGINEER**

Prominent midwestern punch press manufacturer wants another aggressive field engineer to contact distributors. Nationally advertised line. Well established. Good pay. Machinery sales and service experience required. Real opportunity for right man. Send experience, with picture, if available in first letter. All replies confidential.

**SW-4451, AMERICAN MACHINIST**
**520 N. Michigan Ave., Chicago 11, Ill.**

**SALESMEN WANTED**

PRECISION INSTRUMENTS: Jo blocks, Calipers, Mikes, Height gages etc. Want salesmen selling to Tool, Die, Jig, Machine and Aircraft makers. Straight commission.

**AMERICAN EXPORT TECHNICIANS, INC.**
**2 Broadway, N. Y. C. 4, N. Y.**

**MACHINE TOOL RECONDITIONING & the Art of Hand Scraping**
**— illustrated —**
*Write today for folder describing book*
**MACHINE TOOL PUBLICATIONS**
**215 Commerce Bldg., Fourth & Wabasha Sts.**
**St. Paul 1, Minn.**

**PEACOCK CORPORATION**
**Propane Gas Installations**
**and**
**Anhydrous Ammonia Plants**
Paul E. Peacock, Jr., Pres.
**Box 268 Westfield, N. J. Westfield 2-6258**

# 1941-1954 MACHINE TOOLS

**CUTTER & TOOL GRINDERS**
FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit

**DRILLING MACHINES**
ALLEN: No. 2 Drill—6 Spindle, 8" overhang
ALLEN: #2½ High Speed 18" #3 M.T.
BARNES: No. 210, 2-spindle, 21" Swing
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
RADIAL DRILLS: Archdale, 5', 6' & 7', new

**GEAR MACHINERY**
FELLOWS: 61A & 64A Shaper, 18" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)
INTERNAL GEAR GRINDER, GG-31

**GEAR TESTERS**
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 3 Bevel Gear Tester
GLEASON No. 4 and No. 6 Bevel Gear Testers, Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

**GEAR HOBBERS**
CLEVELAND: #130 & 140 Rigidhobbers
REINECKER 60"
BROWN & SHARPE No. 44 20" cap.
LEES BRADNER 49A

**GRINDERS—CYLINDRICAL**
BROWN & SHARPE: No. 10 cap. 6"x18" plain
CINCINNATI: 6"x18" Hydraulic, Plain
LANDIS: 16"x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 12"x18" Type C, Universal
NORTON: 10"x36", 30 Deg. Angle Wheel
NORTON: 10"x18" 45° angle wheel

**GRINDERS—GEAR & SPLINE**
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Spines
GLEASON: #17, 23½" P.D.
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

**GRINDERS—INTERNAL**
BRYANT: No. 5, 5Y, 16-6, 16-CP-16, 16-28, 24-L-36
HEALD: #50 Planetary
HEALD: #72A3 Sizematic
HEALD: #72A3 & #72A5 Extended Bridge

**GRINDERS—RADIUS**
VAN NORMAN: #73, capacity 7⅛"
VAN NORMAN: #649-16, cap. 6" to 16" dia.
VAN NORMAN: #3½" Un. Radius

**HONING MACHINES**
BARNES: Model 172, 2" dia. x 6" stroke
MICROMATIC: H-510 Double End Horizontal, ¼" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2 spindle, ¼" to 1" dia.

**LAPPING MACHINES**
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical

**LATHES—PRODUCTION**
BLOUNT: Polishing speed lathe 12" dia. x 48" centers
LODGE & SHIPLEY: #2A Duomatic, 25½" swing x 27" centers
POTTER — JOHNSTON: #4D Auto Turret

**LATHES—TURRET**
BULLARD: 36" Vertical turret
WARNER & SWASEY: #1A, #2A, #3, #3A, #4, #4A & #5
HERBERT: #0, #2, #4, #7, #8 and #9B/30 Sizes, new

**LATHES—TURRET—continued**
WEBSTER & BENNETT: Vert. 36" & 48" (New)

**MILLING MACHINES**
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: 4" Twin Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

**SAWS & CUT-OFF MACHINES**
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
MARVEL: No. 6A Hacksaw, 6"x6"

**THREAD MILLERS & TAPPERS**
HALL PLANETARY: Mod "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 13⅛" hole
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity.
NATCO: 16 spindle Tapper ⅝" cap.

**MISCELLANEOUS**
GARDNER: Model 84A Double Disc Grinder, 23" Wheel
MOLDING MACHINES, ROLLER JOLT: Osborne Model 2047-3
AUTOMATIC SCREW MACHINE, Wickman Single Spindle, 7/16" New
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½" & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
HARDNESS TESTER: Grogan Brinell, 16-8
SHEFFIELD: Precisionaire Gauge
SUNDSTRAND: Double-End, #53, 42" & 60" Centering Mach.
WIRE FORMING MACHINES: 4-slides (new)

## TRIPLEX MACHINE TOOL CORP.

**75A West Street, New York 6, New York**

**ESTABLISHED 1919**
**Cable Address TRIMACTOOL**

---

**CHAMBERSBURG**

# CECOSTAMPS

**NEW 1945**

**Air operated Impact Machines, Control Lever regulates either single or series of blows of various intensities.**

**SPECIAL PRICED**

| MAX. DIE AREA | STROKE INCHES | DIE, MAX. WEIGHT |
|---|---|---|
| 96" x 60" | 23 | 21,100 |
| 120" x 96" | 34 | 42,300 |

**AARON MACHINERY CO., INC.**
**45 CROSBY ST., N. Y. 12, N. Y.**
**WO-4-8233 Cable: AARMACH, N.Y.**
*RENTAL & TIME PAYMENTS*

---

# McDONALD

**USED MACHINERY**

Columbia 18' Power Square Shear 3/16" cap.
Baush 44" Vert. Boring Mill 2 heads
Knight #40 Vert. Jig Borer
American 20"x8' Grd. Hd. Lathe motor in base
Landis 20"x72" and 18"x96" Plain Ext. Grinder
Hanchett 25 H.P. Sp. Vert. Hydr. Surf. Grinder 12"x48" table.
W & S No. 2-A Grd. Hd. Univ. Turret Lathe chucking.
Rivett No. 104 A.C. M.D. Internal Grinder.
Milwaukee Nos. 2-B & 3-B Horiz. Plain Millers D.O.
Cincinnati 36"x36"x16' D.H. Planer 2 Hds. Box Table.
Heald No. 72A-3 Hydr. Int. Grinder Red Head Sp.
LeBlond 27"x12' Bed Grd. Hd. Q.C.G. Lathe 15" hollow spindle.
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
G & L 3" Bar Horiz. Boring Mill.
Barnes 20" All Grd. Camel Back Drill 1-Sp.
Blanchard M.D. Vert. Sp. Surf Grinder 29" chuck.
Campbell No. 213 abrasive cut off 1944.
Sundstrand 4-Sp. Vert. Rigidmill.
Heald #22 Ret. Surf. Grinder 12" chuck 1942.
Landis 2-Sp. 2" Cap. Bolt Threader M.D.
Hendey 16"x8' bed Q.C.G. Lathe 1939.
W & S No. 4 Ram Type Grd. Hd. Turret Lathe.
G & E 24" Gear Box Shaper Tilt. Table Top.
Norton 48" Table 1-Sp. Cont. Vert. Miller.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kempsmith No. 2 Vertical Maximiller M.D.
Springfield Planer Type Surf. Grinder.
P & J #2 Auto. Prod. Miller, 2 Tables.
Foote-Burt #25 Box. Cst. 1-Sp. Hyy. Drill.
L & N 6", 10" & 12" Press Brakes.
Bullard 24" & 30" Vert. Turret Lathes.
Lynd-Farquhar 20" stroke open-side Shaper Planer.

MONA MEMBER

**McDONALD MACHINERY CO.**
**1531-35 No. B'way., St. Louis 6, Mo.**

---

**ELECTRIC FURNACE TO 1850°**
**with Auto Temperature Control. Sliding door. Cheap to operate. Substantial Dependable for Machine Shop Tool Room.**
8" x 12" x 15" inside 4.5 K.W. $250.00
12" x 16" x 20" inside 9.0 K.W. $500.00
**E. H. WILLIAMS**
**BOX 9042A. HUNTINGTON. W VA.**

---

**FOR SALE**

# PUNCH PRESSES

525 Ton #96½ Bliss. Mfg. 1946. Double Crank-Double Gear. Bed area 55 FB x 108 RL.

525 Ton #209-84 Bliss. Mfg. 1946. Double Crank Gap Pres. Bed area 30 FB x 110 RL.

110 Ton Cleveland. #55G-48. Double Crank. Bed area 28 FB x 60 RL.

125 Ton Cleveland #60G-72. Double Crank Gap Press. Bed area 23 FB x 84 RL.

#206-E Toledo Double Crank Gap Press. Bed area 20 FB x 96 RL.

*Write—Wire—Phone—For Details*

**ARNOLD HUGHES COMPANY**
**2765 PENOBSCOT BLDG.**
**DETROIT 26, WO. 1-1894**

---

# Indianapolis

**MACHINERY & SUPPLY CO.**
1961 South Meridian Street
Indianapolis 5, Indiana

- TG636 Jones & Lamson Precision Thread Grinder, 1942
- HP-100 La Pointe 50 Ton Broach, 1945

*Write for Complete Stock List*

**LATE TYPE MACHINE TOOLS**

BUY FROM STOCK
Telephone
BAKER 5887

# FALK
## MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

*Every Item Guaranteed as Represented*

### LATHES

27"x18' MONARCH "N" Geared Head Lathe, 11' centers, Taper Attach., Full Equipment, Late Type. 1942.

24"x12' BOYE & EMMES Timken Bearing, Geared Head, Lathe. Late Type.

27"x16' NILES, BEMENT, & POND Geared Head Lathe, 9' centers, M.D.

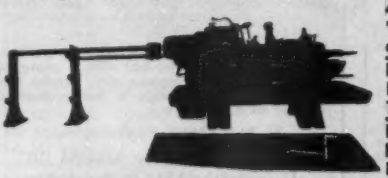
24", 36", 42" BULLARD Vertical Turret Lathe, New Era, Turret Head, Side Head, Motor Driven.

No. 601 W.D. OSTER Motor Driven Turret Lathe, 1½" capacity, Late.

1A WARNER & SWASEY Turret Lathe, Heavy Duty, Power Chuck Wrench, Timken Bearing, M.D.

No. 2, No. 3, No. 5, No. 3A WARNER & SWASEY Geared Head Turret Lathes, Bar Feed, Motor Driven.

24"x10' AXELSON Geared Head, Heavy Duty Model "E" 28" Actual Swing, M.D. Taper Attachment. 1942.



*No. 7 BARDONS & OLIVER Universal Turret Lathe, 2½" capacity. Preselector Head, Late Type.*

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven, Late type.

No. 1 LaPOINTE Motor Driven Horizontal Broach, 5 tons cap., 38" stroke.

50 HP. CHICAGO PNEUMATIC Air Compressor. Type NSB, 253 CFM, Piston Displacement.

10"x10" RACINE #30-C Hydraulic Heavy Duty Shear Cut Power Hack Saw, 1946.

10'x10 ga., 10'x¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

10'x10 ga. CINCINNATI Power Squaring Shear, many extra features; NEW 1948.

#7A THOMAS open back Inclinable Press 80 Ton cap. Flywheel M. D. 1948.

600 ton NILES-BEMENT-POND Motor Driven Wheel Press, 86" between strain rods, 14' cap., 17" diam. ram.

#5, #7 JOHNSON O.B.I. Presses. 56, 79 tons cap. M.D. Flywheel & Geared Type.

### MILLING MACHINES

#2-18 CINCINNATI Plain Auto. Milling Machine, M.D. Late Type.

#2 KEMPSMITH Horiz. Maxi-Mill, Motor in base, Vert. Head.

#08 CINCINNATI Vert. Mill, Plain & Rotary Table Type.

#3B KEARNEY & TRECKER Vertical Milling Machine, Motor in base.

No. 0-8 CINCINNATI Rise & Fall Horiz. Mill, Late Model.

No. 3B KEARNEY & TRECKER Horiz. Mill, Double Overarm, Motor in base.

No. 2M CINCINNATI Universal Horizontal Mill, Full Equipment, M.D.

96" x 86" x 28' NEWTON PLANER TYPE MILLING MACHINE. 2 Heads on Rail; 2 Side Heads; Pendant Control; Late Type.

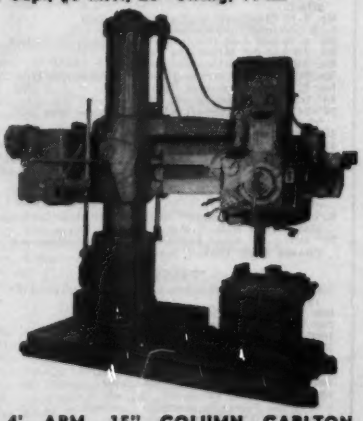
### DRILLING MACHINES

4'x15" Column CINCINNATI-BICKFORD "Super-Service" Radial Drill, Motor on arm, Box table.

No. 262 BARNES Motor Driven Sliding Head Drill Press. 2" cap. in steel. 1941.

No. 2 M.T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type. 1943.

No. M200 DEFIANCE Prod. Drill, 2" cap., #5 M.T., 26" swing, 1942.



4' ARM, 15" COLUMN CARLTON RADIAL DRILL. 48 SPINDLE SPEEDS 15-1500 RPM. MOTOR ON ARM. 1943.

½, 1½ BUFFALO FORGE Universal Ironworker, Notcher and Coper, M.D.

T-56 VERSON Power Press Brake, 8' overall, late type. 100 Tons Cap. 1942.

No. 20, WATERBURY FARREL Thread Roller, ⅜" cap., 1944.

### GRINDERS

12"x36" LANDIS Universal Cylindrical Grinder, Excello Internal Spindle, M.D.

6"x18" LANDIS Type "C" M.D. Hyd. Cylindrical Grinder, Serial #29196.

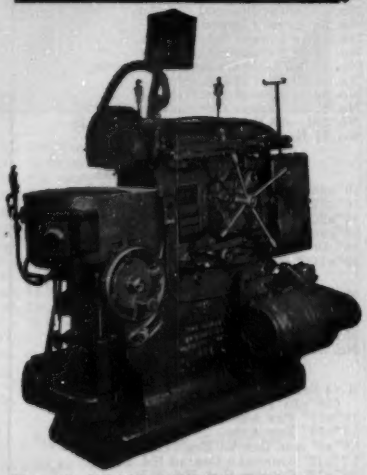
6"x18" NORTON Vertical Hydraulic Surface Grinder, complete with magnetic chucks, coolant systems, Late.

#TG615 JONES & LAMSON Thread Grinder, Late, M.D. and TG848.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

No. 13 BROWN & SHARPE Universal Tool & Cutter Grinder. Serial #5175. Complete tooling. 1943.

12"x36" MATTISON M.D. Hydraulic Surface Grinder, 15 HP Spindle Motor. Coolant System.



*No. 22 HEALD MOTOR DRIVEN ROTARY SURFACE GRINDER. 12" Magnetic Chuck. Late Model.*

20", 24", 28" GOULD & EBERHARDT V-Ram Shapers, M.D.

No. 194 BARNES Vertical Hone, 4" capacity, 12" stroke. Motor Driven.

30 K.W. LEPEL High Frequency Induction Heater.

No. 8LS FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

15' x 10' x 36' BETTS PLANER, DOUBLE HOUSING, BOX TABLE, 2 Swivel Heads on Rail; 2 Swivel Side Heads; Pendant Control Variable Speed Main Drive Motor, 75 HP.

**OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK • SEND US YOUR INQUIRIES**

## HILL-CLARKE MACHINERY COMPANY

**For more complete list, send for our latest "Green List" #163**

**BORING MACHINES**

100" Niles-B-Pond Vert. Bor. Mill.

**DRILLS**

4'11" American Hole Wizard Radial Drill.
No. 2 Avey Cam Fd. Drill. 14" Swing.
No. 2 MA-6 Avey 24"-1-Spdl.
2 Spdl.—24" SW.—No. 8 Avey.
No. K60H Fox 16 Spdl. Multi Drill.
No. 2—20" 2-Spdl. Leland-Gifford LMS
No. LBM—20" 3 Spdl Leland-Gifford Drill.

**GEAR MACHINES**

11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
615-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.

**GRINDERS**

No. 214 Besley Double End Disc Gdr.
5"x30" Cam-o-matic (1948).
6"x18" Norton Type C Plain (1943).
10"x36" Norton Type C Grinder.
10"x36" Norton Type C Cam Grinder.
10"x48" Norton Type C Pl. (1948).
No. 4 Cinn. Hi-Speed Dial Type Pl. (1944)
TG 615 J & L Thrd Gdr.
B24-25" Chuck Arter Surf.
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16-28 Bryant Int. Grinder.
No. 16 A-28 Bryant Internal Grinder.
No. 16-32 Bryant Int. Gdr.
No. 24-26 Bryant Int. Grinder.
No. 24-36 Bryant Internal Grinder.
No. 24L—36 Bryant Hyd. Internal Gdr.
No. 81 Heald Internal Centerless.

**HILL-CLARKE NORTON TYPE MOTOR DRIVEN GRINDERS**

10"x36" Centers. 14"x36" Centers.
10"x72" Centers. 14"x50" Centers.
10"x96" Centers. 14"x72" Centers.
18"x96" Centers. 14"x96" Centers.
18"-30" gap x 90" Centers.
18"x120" Centers

**HONES**

Model H-2 Micromatic Horiz. Hone.
Model 206-H5-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone
No. 224 Barnes Vert. Hone
No. 306-H Barnes Vert. Hone.

**LATHES**

R-14 Seneca Falls Le-Swing Lathe. (16"x32")
12"x21" Pay Auto.
12"x36" Pay Auto.
18"x6' Am. Geared Head Lathe.
27"x12' American Geared Hd. Lathe.
36"x18' Putnam Grd. Hd. M.D.
No. 2 Warner & Swasey Geared Head Tur.
No. 3 Warner & Swasey Bar Feed Turret.
No. 5W Acme Tur. Lathe (Late).
No. 3AL Gisholt, Cross-Slide Turret.
No. 4A Warner & Swasey Turret.
No. 6 Warner & Swasey, cone head, Turret.
2¼"x24" Jones & Lamson, turret.
3H-10 Libby International, 29" Sw.
18" Libby, M.D., turret.
No. 4A Warner & Swasey (1944).

**PLANERS**

48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

**MILLING MACHINES**

No. 2-HL Kearny & Trecker Pl. Mill.
No. 3K Kearney & Trecker Vert.
No. 0S Cincinnati Vert. (1942).
4" Taylor & Fenn Duplex Spline.
10"x48" Hanson-Whitney Thrd. Mill.
10"x60" Pratt & Whitney Thrd. Mill.
12"x102" Mod. HT Lees Bradner Thrd. Mill.
54"x30"x16' Ingersoll Slab Mill.

**HILL-CLARKE**
**651 WASHINGTON**
**CHICAGO 6, ILL.**
***Phone: Central 6-0500***

## LATE MODEL GUARANTEED MACHINE TOOLS

**BORING MACHINERY**

Model 61 Exzello 6-spindle cyl. borer, 1948
42" Bullard New Era vertical T/L
3½" Bar No. 52 Lucas, horizontal, table type
36" Rogers vert. T/L side head, new 1942
36" Bullard vert. T/L, side head, #11325
72" Niles Bement Pond 2 heads, PRT. #17633

**DRILLS, RADIAL**

3½ ft. arm 8" column American sensitive
4' arm 13" col. Carlton M.O.B.
8 ft. arm 16" column American, late type.

**GEAR HOBBERS**

Type A Barber Coleman universal
No. 3 Barber Coleman std (3)
No. 12 Barber Coleman (3)
No. 12H Gould & Eberhardt universal
No. 36H Gould & Eberhardt universal
72" Schuchardt & Schutte universal

**GRINDERS, CYLINDRICAL**

4"x18" Cincinnati pl. hyd., plunge cut, 1948
6"x30" Norton "C" hyd., 1942.
10"x18" Norton types BA, A C, late models
10"x18" Cincinnati filmatic, type ER (2), 1941-1948
10"x36" Norton type C hydraulic (2), 1943
14"x36" Landis type C, hydraulic (2), 1946
16"x36" Norton type C, hydraulic (2), 1943
18"/28"x72" Norton type C, hydraulic, 1945
18"/40"x120" Landis gap type, hydraulic, serial 16193
18"/48"x20" Landis gap type hydraulic, new 1941

**GRINDERS, SURFACE**

16A2 Blanchard rotary surface, serial 6046, 1946
6"x18" Norton vert. spdl, hydraulic, 1942
8"x22" No. 3 Abrasive, motor in base
12"x48" Model 306 Hanchett vert. spdl. 1946
14"x36" Pratt & Whitney vertical surface grinder, 1942.
72" No. 72 Hanchett rotary surface, 1946

**GRINDERS, MISC.**

No. 2 Cincinnati univ. tool and cutter, new 1942
No. 13 Brown & Sharpe universal tool, new 1942

**INTERNAL GRINDERS**

Nos. 72, 72A3 and 72A5 Heald
No. 5 Bryant semi-automatic chucking
No. 2 Cincinnati centerless (3). 1942-1943
No. 48 Van Norman radius, 1945

**LATHES, ENGINE**

14"/28"x36" centers Smith-Drum, gap, 1945.
14"x42" Hendey G.H., M.I.B., 1940
24"x14 ft. bed American G.H., G.C.G., serial 44070
52"x30 ft. bed Niles Bement Pond G.H., like new

**LATHES, MFG. & MISC. & TURRET**

17"x72" LoBland Rapid production (5), 1946-1947
No. H5 Libby International saddle type universal turret lathe, 1940
No. 5 Jones & Lamson Universal ram type turret lathes, (2) late models

**MILLING MACHINES**

No. 2 Brown & Sharpe vertical
No. 2 Cincinnati Hi-Power plain horizontal
No. 4 Cincinnati Hi-power plain horizontal
No. 5 Cincinnati Hi-power plain horiz., vert. attach.
No. 2-18 Cincinnati production mill, late
1-12 Cincinnati production miller
No. 4-36 and 4-48 Cincinnati Hydromatic productions
No. 2B and 3K Milwaukee universal
No. 3B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain, late type
No. 22L Van Norman pl. horiz., 1942.
54" Ingersoll 3 spdl rotary, 1940.
24"x24"x12 ft. Ingersoll adj. rail planer type mill, tracer controlled, 1945
30"x21"x12 ft. Ingersoll fixed rail planer type mill
42"x42"x18 ft. Ingersoll adj. rail double housing mill, 2 S.H. and 1 R.H. power on rail and head
42" Ingersoll 3 spindle rotary continuous mill
42" Ingersoll 2 spindle rotary continuous mill
43"x20"x20 ft. Ingersoll fixed rail double faced planer type mill
60"x48"x16 ft. Ingersoll adj. rail double housing planer type mill, 2 S.H. and 2 R.H.
72" swing 84" table Ingersoll 2 spindle rotary continuous mill, timken bearings.

**PRESSES**

500 Ton Baldwin Southwark Hyspeed Hydraulic (2) 1939
600 Ton No. 2316¼ Hamilton Forging
750 Ton No. 3 National Maxi-Press
1000 Ton No. 866 Toledo Forging
105 Ton No. 7½ Verson O.B.I. (2)
200 Ton No. 23 Bliss embossing
300 ton No. 1039 Hamilton S.A., D.C.
400 ton No. 688 Toledo knuckle joint
100 Ton No. 93C Toledo SS. DC. air cushion
2 to 70 ton Ferracute punching (several)
8 to 60 ton O.B.I., most every make
500 ton No. 1042 Verson, steel frame, air clutch.

**SHAPERS & SLOTTERS**

0" Pratt & Whitney vertical shaper (2) 1942.
24" Gould & Eberhardt ind. universal shaper
32" Gould & Eberhardt Invincible, F.M.D.
36" Rockford vert. hyd. slotter, 1942

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GRINDER, 10"x96" Landis Hyd., Late
GEAR SHAPERS, Nos. 645AS, 61A & 61 Fellows
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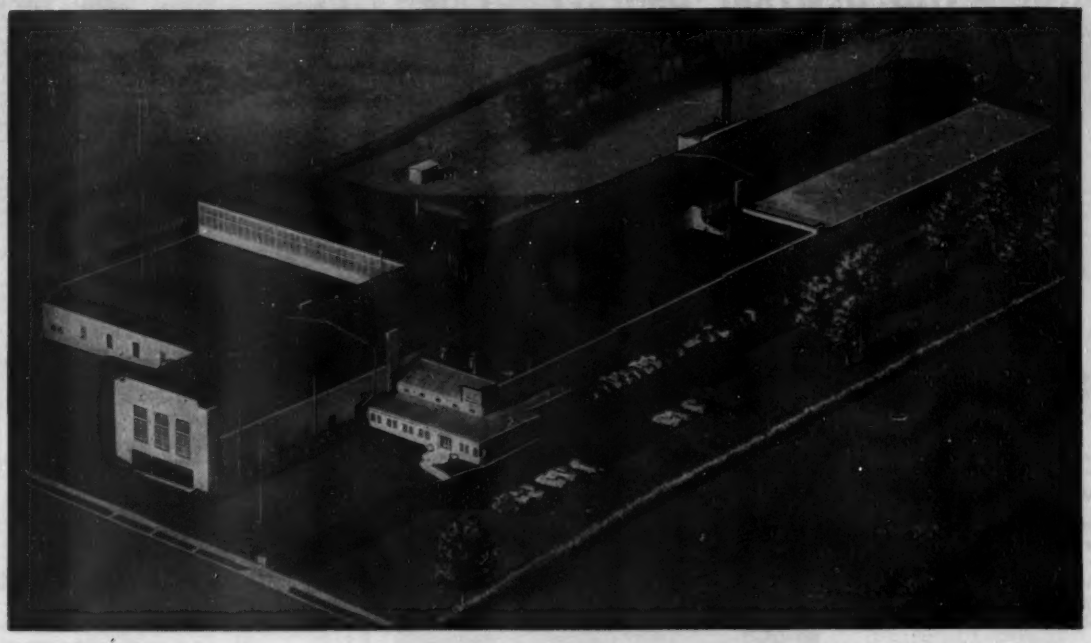

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Model V10 Hammond Belt Sander, m.d.
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6x18" Cincinnati Model EA, m.d.
6x18" Cincinnati Model ER Plain Hydraulic, m.d., Filmatic Spindle
6x18" Landis Type C Hydraulic, m.d., late
6x30" Cincinnati Hydraulic, m.d.
10x18" Cincinnati Model EA, m.d.
10x18" Norton Type C, m.d., latest
10x36" Cincinnati Hydraulic, m.d.
10x72" Landis, m.d.
10x72" Norton, motorized
12x36" Landis, m.d.
12x96" Landis Plain Self-Contained, m.d.
14x18" Cincinnati Plain Self-Contained, m.d.
14x48" Cincinnati Plain Self-Contained, m.d.
14x32" Norton, motorized
16x72" Landis Plain, m.d.
10x120" Norton Type C, m.d., late
16" raised to 28"x72" type C Norton, m.d.
18x72" Norton Type C, m.d.
No. 20—10x18" Brown & Sharpe, m.d.
20x120" Landis Plain Self-Contained, m.d.

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No. 3 Brown & Sharpe Universal Grinder, m.d.
6x20" Fitchburg Hydraulic Spline & Gear Grinder, m.d., latest
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12x48" Norton Universal, m.d., latest
18x60" Landis Universal Type C, m.d.

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No. 2B Brown & Sharpe, m.d.
No. 12! Hanchett Production Face Grinder, type BD, m.d.
No. 16—26" Blanchard, m.d.
No. 22—12" Heald Rotary, m.d.
No. 33 Abrasive Vertical, m.d.
No. 260—16" Heald Rotary, belt
14" Pratt & Whitney Vertical, m.d.
No. A-1-8 Artar Surface Grinder

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Model #182 Barnesdrill Hone, m.d., latest
Model 306H Barnes, single spindle

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No. 16—22" Bryant, m.d., latest
No 16—38" Bryant, m.d., latest
No. 16-A-28 Bryant, m.d.
No. 24-36 Bryant, hole and face type, m.d., late
No. 24P—06" Bryant, m.d.
No. 24—21" Bryant, m.d.
No. 24-L-36 Bryant, m.d., late
No. 44 Heald Facing Type Borematic, m.d.
No. 70A Heald, m.d., latest
No. 72 Heald Sizematic, m.d.
No. 72A Heald Sizematic "Duplex", m.d.
No. 72A Heald Gagematic, m.d.
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 72A5 Heald Sizematic, m.d.
No. 72A5 Heald Plain, m.d.
No. 73 Heald Airplane, m.d., latest, new
No. 74 Heald, m.d.
No. 75A Heald, m.d. latest
No. 78 Heald Centerless Cylinder Grinder, m.d.
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Gleason Cutter, belt drive
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No. 2B Sellers Wet Grinder, m.d.
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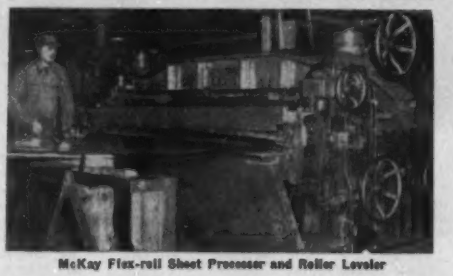

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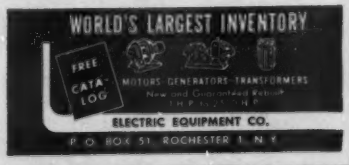


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GLEASON No. 6 Tester; late type
GLEASON No. 7 Hyp. Cutter Sharp; latest type
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GLEASON No. 17 Spiral Bevel, Zarol and Hypoid Gear Grinder, M.D., late
GLEASON No. 18 Gear Tester and Lapper; M.D.
GLEASON No 20 Spur Gear Tester; latest type
GLEASON #22 Hypoid Formate Gear Finisher; late
GLEASON 25" Straight Bevel Gear Gen.; M.D.
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GLEASON No. 6 Revacycle 5" cone distance; late

### GRINDERS, Cyl. Plain & Univ.

CINCINNATI 14"x72" Universal; M.D., late type
CINCINNATI 6"x18" Model ER Plain, "Filmatic"; late type
LANDIS 10"x18" type C Plain, Hydraulic, late
LANDIS 14"x36" type DC plain hydr. with infeed; late
NORTON 4"x12" Model CTU Plain, year 1953
NORTON 6"x18" Type "C" Plain; late type
NORTON 16"x72" type "C" Plain; late type

### GRINDERS, Surface

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MOREY #2, #3, #4 ram type; Timken; latest type
WARNER & SWASEY #1-A Universal; Hex., late
WARNER & SWASEY #2 Geared Head; late
WARNER & SWASEY #3 and #5 Univ. ram type, latest type

### LATHES, Engine & Mfg.

HENDEY 24"x36" centers; motor drive; late type
LeBLOND 42"x108" centers, Timken; M.D., late type
LODGE & SHIPLEY 12"x30" centers, Toolroom
LODGE & SHIPLEY 14"x30" centers; late type
MONARCH Model EE 10"x20" centers, Toolroom; late
MONARCH 12"x30" centers; Model CKK; late type
NILES 30"x50' bed, single and boring, "Time Saver"
NILES 36"x108" centers "Time Saver"; motor drive; late type
PRATT & WHITNEY 16"x30" centers; Timken
REED PRENTICE 14"x54" centers, Timken, late
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### MILLING MACHINES, Plain

BROWN & SHARPE #2 M.D. late type
CINCINNATI 1-18 Production; Timken; late type
KEARNEY & TRECKER 2H, 2HL, & 4H, M.D., late

### MILLING MACHINES, Thread

HALL Style "D" Planetary; late type
LEES BRADNER Model #LT 6"x30" #HT 12"x24" and #HT 12"x36" centers; late type
MOREY 12"x30" and 12"x160" centers; late type

### MILLING MACHINES, Universal

CINCINNATI 2MH Univ., motor drive, late type
CINCINNATI #3 Dial Type, Timken, M.D., late
KEARNEY & TRECKER #3K; Timken; late type
VAN NORMAN #22L, #28 and #36 ram type; late

### MILLING MACHINES, Vertical

CINCINNATI #4 High Speed Dial type; late
CINCINNATI 0-8 Vertical; Timken; late type
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GOULD & EBERHARDT 32"; High Speed; motor drive; late type
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BARNES No. 172 Honing; M.D., hydr.; late
LeBLOND No. 2 Deep Hole Reaming, late type
LeBLOND No. 2 Deep Hole Rifling, late type
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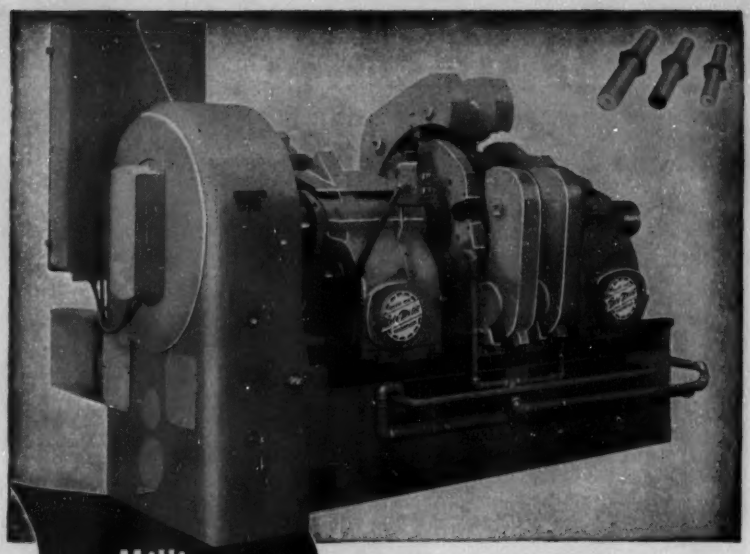

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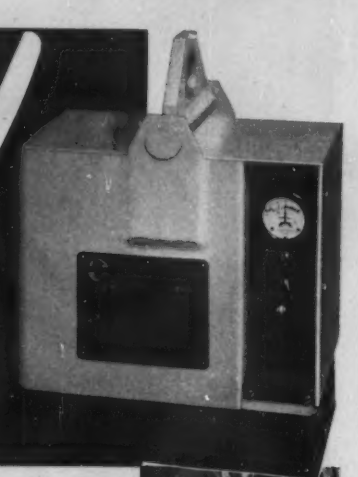

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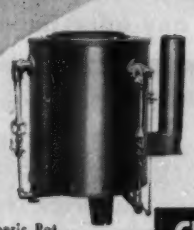

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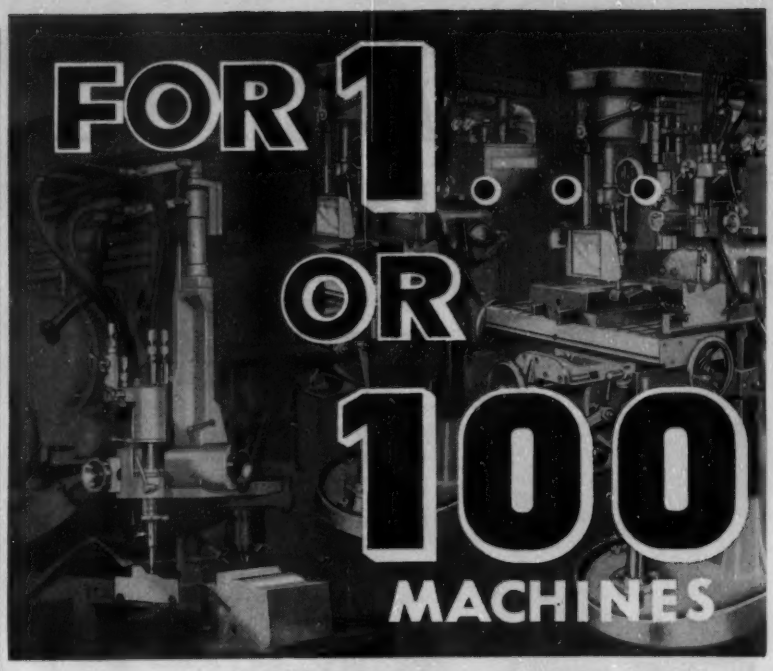


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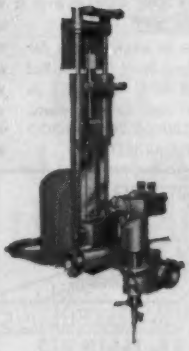

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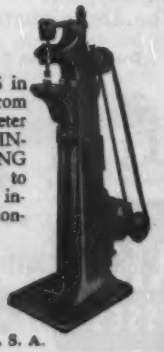

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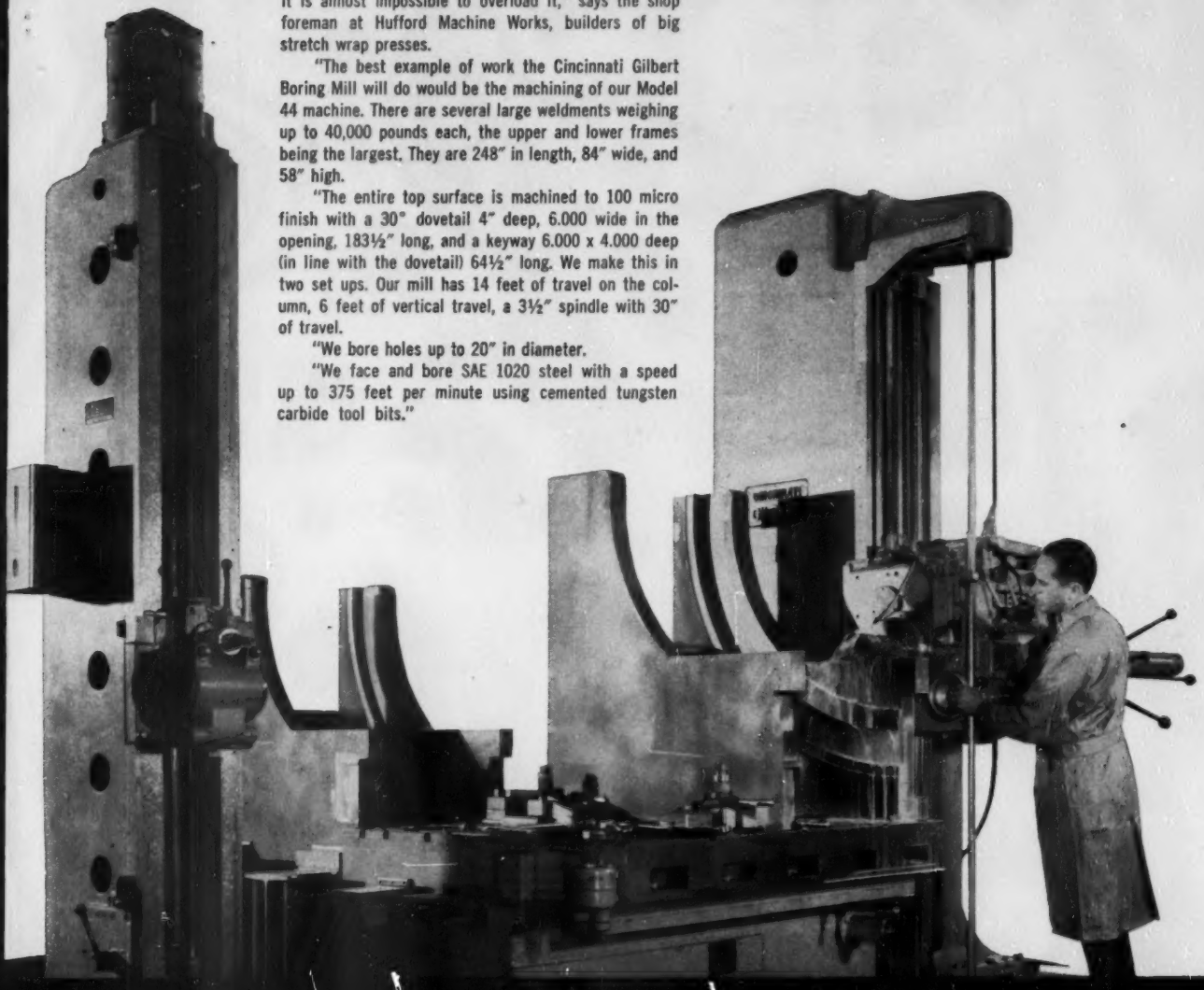

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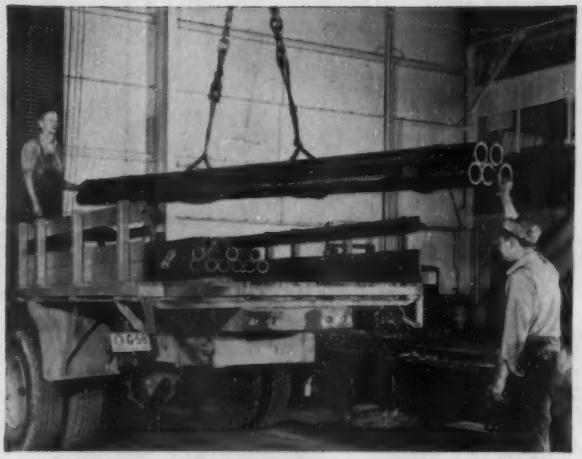

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